# University of Alberta

Testing an Integrative Model of Binge Eating During the Transition to University

by

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## ABSTRACT

Common symptoms of poor adjustment to university include health-risk behaviours such as eating problems. Few studies have explicitly explored connections between university adjustment and eating problems. The current study tested an integrative model of binge eating during the transition to university. Participants were 167 full-time first-year students at the University of Alberta (*M* age = 18.4 years, *SD* = .49; 62% female). Participants completed a background questionnaire and then a web-based daily checklist for 14 consecutive days in the first 12 weeks of the academic year. The goal was to explore between-person differences in average levels of symptoms of binge eating across 14 days and day-to-day covariation between symptoms of binge eating and daily experiences. Hierarchical Generalized Linear Modeling was used to predict the likelihood of reporting symptoms of binge eating. The first model tested was the vulnerability model. Risk factors that emerge in adolescence might be vulnerabilities for binge eating when combined with transitional challenges. Female gender, greater internalization of body ideals, and greater body dissatisfaction were associated with an increased likelihood of reporting symptoms of binge eating. The second model was the emotion regulation model, which holds that binge eating serves to reduce stress and/or negative affect. On days participants reported more stress and more negative affect, the likelihood of binge eating increased. The likelihood of reporting symptoms of binge eating was greater for participants with an emotion-oriented coping style. The third model was the university adjustment model. Binge eating may emerge during the transition to university as a mode of psychological accommodation to transitional challenges. Poor academic adjustment was associated with an increased likelihood of binge eating. Poor social adjustment was

associated with an increased likelihood of binge eating for females only. The final model was the integrative model. Goodness-of-fit tests revealed that with the inclusion of each set of variables (vulnerability, emotion regulation, university adjustment), the prediction of binge eating symptoms was improved. The current study helped move forward the study of risk factors for eating problems both theoretically and empirically by demonstrating that complex person-context interactions predict binge eating during the transition to university.

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# CHAPTER I

## INTRODUCTION

For many young people today increased freedom, opportunity, and exploration characterize the transition from adolescence to adulthood (Arnett, 2000, 2004). Indeed, as the transition has become more individualized and heterogeneous, developmental pathways leading to adult independence are increasingly diverse (Shanahan, 2000; Sherrod, Haggerty, & Featherman, 1993). Arnett (2000, 2004) argues that variability is one of the defining features of the period of the lifespan he calls "emerging adulthood," which ranges from ages 18 to 25, and often extends through the 20s. He argues that in contemporary industrialized societies a prolonged period of semi-independence follows adolescence. Achievement of complete independence and responsibility, traditionally signified by role transitions such as completing education, establishing a career, moving out of parents' home, and getting married occur at later ages for young people today, compared to past generations (Arnett, 2002). Transitions to adulthood are best characterized as processes (Hogan & Astone, 1986); individuals develop necessary skills, attitudes, values, and social capital as they move from dependence on one's family to self-reliance and adult forms of interdependence (Eccles, Templeton, Barber, & Stone, 2003). For example, Cohen, Kasen, Chen, Hartmark, and Gordon (2003) found that the transitional patterns of 17- to 25-year-olds included periods of within-person variability characterized by more and less independence.

An inherent component of any transition is change. With change comes potential for growth and successful adaptation, but also vulnerability (Sherrod et al., 1993). How do young people fare during the transition to adulthood? That is, how does the transition

affect their well-being? Galambos, Barker, and Krahn (2005) found much intraindividual variability and interindividual differences in intrainvidual trajectories of well-being from age 18 to 25. Results from Statistics Canada's Canadian Community Health Survey on mental health and well-being (Statistics Canada, 2002, 2003) showed that prevalence rates for many mental health problems peak during late adolescence and emerging adulthood (ages 15 to 25). These include anxiety disorders (5.8% of females, 3.6% of males), major depressive disorder (8.2% of females, 4.3% of males), eating disorders (3.8% of females, males not reported), and alcohol dependence (8.0% of females, 15.8% of males). In total, about 18% of 15-to 24-year-olds suffered from one of the five mental disorders or two substance dependencies studied (Statistics Canada, 2003).

Understanding how individuals navigate developmental transitions is at the crux of understanding risk for negative outcomes (Graber & Brooks-Gunn, 1996). Transitions can contribute to stressors that may exceed the coping resources of some individuals; transitions may alter the match between individual needs and contextual resources; and developmental transitions may exacerbate ongoing risks. Risks to successful development increase as an individual's sense of balance and well-being is disrupted and increase further when multiple and simultaneous transitions are experienced (Graber & Brooks-Gunn, 1996; Maggs, Schulenberg, & Hurrelmann, 1997).

Conversely, transitions may provide opportunities for improved health as a result of successful adaptation (Graber & Brooks-Gunn, 1996; Maggs et al., 1997). After high school, problems associated with adolescence decrease and well-being increases for many adolescents. Galambos et al. (2005) found that from age 18 to 25, trajectories of self-esteem increased on average and trajectories of depression and expressed anger

decreased on average. Relationships with parents also improve during this period (Aseltine & Gore, 1993; Lefkowitz, 2005). What factors contribute to increased risk for negative outcomes for some emerging adults and increased well-being for others?

For many emerging adults navigation of the transition to adulthood begins at university. According to Statistics Canada's Youth in Transition Survey, 70% of high school graduates pursue some form of post-secondary education. In 1998, 52% of youth ages 18 to 20 were enrolled in postsecondary education; 44% in four-year universities or colleges (Bowlby & McMullen, 2002). Characteristics of university life provide emerging adults with opportunities and freedom to explore their identities, but at the same time new demands and norms can be stressful (Sherrod et al., 1993). Many of these demands derive from the dramatic changes that occur in the lives of emerging adults attending university. Changes occur in behavioural autonomy, family and peer relationships, academic demands, and lifestyle options (Adams & Pratt, 2000; Flanagan, Schulenberg, & Fuligni, 1993; Schulenberg & Maggs, 2002; Zirkel, 1992). New challenges include getting along with roommates, competing in a new academic environment, forming romantic relationships, and living on limited financial resources (Berzonsky & Kuk, 2000; Bowlby & McMullen, 2002; Cantor & Langston, 1989). Among a representative sample of college freshmen in the United States, 25% reported feeling frequently overwhelmed with all they had to do in the past year (Sax, 1997). A recent University of Alberta study found that a substantial minority of students (20% or more) felt that the following factors interfered with their academic work: feeling emotionally unstable, moving away from home, adjusting to university, managing time effectively, and poor study habits (Student Counselling Services, 2003). Students who

experience increases in stress and depressive symptoms over the course of their first year also perceive their overall adjustment to university to be poor, and poor perceived adjustment predicts lower GPA (Wintre & Yaffe, 2000). Emotional and social difficulties are related to poor academic performance (Parker, Summerfeldt, Hogan, & Majeski, 2004) and explain attrition better than does academic standing (Gerdes & Mallinckrodt, 1994). One quarter of university students in Canada (16% at the University of Alberta) leave university prior to their second year (Matusky, 2001).

For some students poor adjustment to the challenges of university may take the form of health-risk behaviours. For example, alcohol use, and heavy episodic alcohol use in particular, increase in university (Schulenberg & Maggs, 2002). The onset of disordered eating is also linked to the transition to university (Striegel-Moore, Silbertstein, Frensch, & Rodin, 1989). Although myriad studies have been conducted with university samples, few have explicitly explored the links between the transition to university and disordered eating. Binge eating symptoms occur among 48% of women and 17% of men in university (Striegel-Moore et al., 1989). Binge eating is a defining feature of Bulimia Nervosa (BN) and Binge Eating Disorder (BED) (APA, 1994; Steiger, Bruce, & Israël, 2003). In BN, a binge is characterized as an episode of food consumption, of often unusually large quantities of food, accompanied by a loss of control over one's eating (APA, 1994; Fairburn & Wilson, 1993; Steiger et al., 2003). In BED, binges are further characterized by feelings of distress about overeating (APA, 1994; Fairburn & Wilson, 1993; Steiger et al., 2003). Binge eating predicts weight gain over time and is more prevalent among obese individuals (Striegel-Moore & Franko, 2003). Epidemiological studies show that the prevalence rate for Bulimia Nervosa (BN)

ranges from 1% to 2% in adolescent and emerging adult females; sub-threshold forms are thought to be much more prevalent (Hoek & van Hoeken, 2003; Steiger et al., 2003). Peak prevalence rates occur in emerging adulthood (Steiger et al., 2003). There is little firm data on the prevalence rates of Binge Eating Disorder, but estimates range from 1% to 5% in the general population and to 8% in the obese population (Steiger et al., 2003). This eating disorder has a more even gender-based distribution and affects a broader age group than does BN (Steiger et al., 2003).

What are the processes by which the features of the transition to adulthood, and to university in particular, contribute to disordered eating behaviour? Two somewhat separate lines of research on risks for binge eating lend themselves to explicit exploration during the transition to university. The first line of research can be called a vulnerability perspective (Connors, 1996). In a recent meta-analysis, Stice (2002) reviewed methodologically rigorous studies in order to permit strong inferences about etiological factors for eating problems. He looked for causal risk factors, those that predicted the onset of eating problems in participants who at initial assessment did not evidence eating problems, and causal maintenance factors, those that predicted continued eating problems in participants with eating problems at initial assessment. Internalization of a thin body ideal was a causal risk factor for dieting and bulimic pathology and a maintenance factor for bulimia pathology. Body dissatisfaction was a causal risk factor for dieting, general eating pathology, and a causal maintenance factor for bulimic pathology (and was identified as one of the most robust and consistent risk and maintenance factors for eating pathology). These results reveal possible vulnerabilities that, when combined with transitional challenges, may contribute to disordered eating. Indeed, longitudinal results

indicate that body dissatisfaction in early adolescence is predictive of later eating problems (Attie & Brooks-Gunn, 1989; Graber, Brooks-Gunn, Paikoff, & Warren, 1994).

A second line of research on risks for binge eating focuses on the links between stress, negative affect, and coping—an emotion regulation perspective (Connors, 1996; Polivy & Herman, 1993). Learning to regulate emotions in a mature or adaptive way is a task of adolescence that continues into emerging adulthood and may be challenged by the demands of the transition to adulthood (Galambos & Costigan, 2002; Schulenberg, Bryant, & O'Malley, 2004). All three factors are linked to binge eating in clinical and community samples of adolescent and university-aged females. In Stice's (2002) review, negative affect was a risk factor for eating pathology, a causal risk factor for increased caloric intake, and a causal maintenance factor for binge eating among individuals with an eating disorder. The results of daily diary studies show that stress and negative affect covary with binge eating—on days when people binge eat, stress and negative affect are elevated (Wolff, Crosby, Roberts, & Wittrock, 2000). Furthermore, these and other studies have found links between binge eating and use of ineffective coping strategies; individuals who binge eat may use less effective coping strategies to deal with stress and negative feelings (Koff & Sangani, 1997; Wolff et al., 2000).

How might adjustment to university contribute to risk for binge eating among first-year students? The developmental systems perspective has been called upon as a framework to aid in understanding the mechanisms at play in determining alcohol use in university students (Schulenberg & Maggs, 2002). A similar case can be made for studying binge eating. Developmental systems theory holds that organismic change arises from dynamic interactions between the individual organism and multilevel, integrated

contexts in which it is embedded. Patterns of relationships among contextual systems produce individuals' behaviour, and changes in these patterns produce developmental change (Dixon & Lerner, 1996; Lerner, 1998; Lerner & Kauffman, 1985). The challenge for developmental psychologists is to understand the system or processes linking individuals and contexts (Lerner, 2002; Lerner, Lerner, DeStefanis, & Apfel, 2001). This perspective extends to the developmental model of psychopathology where the organism and context are considered inseparable influences on pathology development (Sroufe, 1997). Developmental outcomes, including those that are behaviourally and/or emotionally disturbed, are viewed as developmentally constructed through transactional processes of adaptation involving the active individual and their developmental context (Egeland, Carlson, & Sroufe, 1993; Sroufe, 1997).

Developmental researchers have speculated that the emergence of eating problems in adolescent women may represent a mode of psychological accommodation to transitional challenges encountered during the transitions to and from adolescence (Attie & Brooks-Gunn, 1992). That is, for some adolescents, adaptation to the developmental challenges of these periods may take the form of problem eating (Smolak & Levine, 1996). Although much attention has been given to the role of person-context interaction in prediction of eating problems in early adolescence (e.g., pubertal development, academic demands, initiating dating, changes in relationships with parents; see Cauffman & Steinberg, 1996; Levine & Smolak, 1992; Swarr & Richards, 1996), little research has focused on person-context relations during the transition to university.

From this perspective binge eating evidenced during the transition to university is best understood as arising from the individual in interaction with changing contexts.

Deriving from this perspective are three general research questions that guide the current study and form the basis of the literature review that follows: To what extent are binge eating symptoms in first-year university students (a) rooted in earlier vulnerabilities, (b) related to regulation of stress and emotion, and (c) influenced by adjustment to the university context?

# CHAPTER II

## LITERATURE REVIEW

The purpose of this chapter is to review literature relevant to understanding how binge eating may develop during the transition to university (the period following high school extending across first-year university). To begin, an overview of developmental systems theory is presented. This overview introduces the theoretical framework of the study, emphasizing the role of person-context interaction in development. A discussion of how developmental transitions alter person-context interactions and promote risks to well-being follows. Next, relevant literature on binge eating is presented in two sections, each exploring a different model of the development of binge eating. The first points to risk factors for binge eating that can be considered personal vulnerabilities. The second model is the emotion regulation model wherein binge eating is thought to arise as a means of coping with stress and negative affect. Although much of the relevant research was conducted with university-aged samples, the next section of the chapter points out that little research has been conducted with the explicit goal of understanding the role the transition to university plays in the development of binge eating. Literature on eating problems in university samples and literature on adjustment to university are presented to support the argument that poor university adjustment might contribute to binge eating. Concluding the chapter is the presentation of an integrative conceptual model linking vulnerabilities, emotion regulation, and university adjustment to binge eating using a person-context framework; research questions derived from this model are posed and predictions about outcomes are made.

*Developmental Systems Theory*

Tasks of developmental psychology include describing, explaining, and optimizing within-person change and between person differences in this change (Baltes, Reese, & Nesselroade, 1988; Lerner, et al., 2001). From a developmental systems perspective, organismic change is viewed as arising from dynamic interactions between the organism and multilevel, integrated contexts in which it is embedded. Patterns of relationships among contextual systems produce individuals' behaviour, and changes in these patterns produce developmental change (Dixon & Lerner, 1998; Lerner, 1998; Lerner & Kauffman, 1985). The basic process of development is relational, whereby systematic successive change (i.e., development) is associated with alterations in the dynamic relations among the multilevel integrated contexts (Lerner, 2002; Lerner et al., 2001).

There are four interrelated assumptions of developmental systems theory that aid our understanding of developmental change over time. When applied to the study of eating problems, these assumptions direct our attention to the importance of considering person-context interaction.

*Assumption (1) relationism and integration of levels of organization.* As mentioned, dynamic relations between individuals and multiple interrelated contexts produce development. The individual and the multiple interrelated contexts form a system that is integrated—individual characteristics have implications for development depending on the context and significant changes to contexts have implications for individual development. To fully describe and explain development the person and context must be considered together (Lerner, 1996, 1998). Eating problems then, like

other behaviours, arise from person-context interactions. To understand fully how eating problems develop, person and context variables should be explored together in interaction.

*Assumption (2) historical embeddedness and temporality*. Change over time is continuous and temporality is infused in all levels of the integrated system. Individuals and contexts will change and person-context relations will be altered (Lerner, 1996, 1998). Altered person-context relations resulting from entering a new context may contribute to eating problems. That is, adaptation to dramatic contextual changes associated with the transition to university may take the form of eating problems for some individuals.

*Assumption (3) individual differences and diversity*. With continuous change in person-context relations, between-person differences in developmental pathways emerge; interindividual differences in intraindividual change will be evident (Lerner, 1996, 1998). Diversity might be especially evident during transitions. Transitions are relatively universal developmental challenges that connect major life periods and require new modes of adaptation to change (Graber & Brooks-Gunn, 1996; Schulenberg & Zarrett, in press). Individuals select themselves into transitions and transitions accentuate individual differences (i.e., diversity) through the negotiation of novelty, ambiguity, and uncertainty (Elder, 1998). Transitional challenges do not result in eating problems for all individuals because of the different sets of skills, abilities, and personal characteristics individuals bring to their lives. Individual differences in adaptation are expected and the development of eating problems may be one pathway that emerges during the transition to adulthood, depending on, for example, attributes such as coping styles.

*Assumption (4) relative plasticity.* Within individuals, potential exists across the lifespan for different levels of functioning. Discontinuities, or changes in level of functioning from one time to another, may arise from changes in individuals or contexts or both (Lerner, 1996, 1998). Developmental processes that contribute to continuity or discontinuity include maintenance of or drastic changes in social networks and supports for behaviour, one's consolidated history of experiences, and individual choices and preferences (Cairns & Hood, 1983). That is, developmentally distal and proximal processes influence continuity and discontinuity. The formative contribution of early (i.e., distal) experiences contribute to continuity, whereas proximal influences, such as transition effects, may be linked to discontinuity. Discontinuity characterizes transitions as individuals exit from one set of roles and enter others (Elder, 1998; Schulenberg, Maggs & O'Malley, 2003). Distal and proximal influences may interact however, with earlier influences setting the stage for proximal influences (Schulenberg, Sameroff, & Chiccetti, 2004). Eating problems that emerge during the transition to adulthood may be linked to previous levels of functioning (e.g., between-person differences in vulnerabilities), to current situations (e.g., adaptation to transitional challenges), or both (i.e., person-context interaction).

To illustrate these points, implications of person-context interaction for well-being during the transition to adulthood are presented in the following section. The transition to adulthood is a major life transition wherein all aspects of developmental systems are challenged (Schulenberg et al., 2004). On average, well-being is enhanced by the transition to adulthood, especially when individuals succeed at negotiating salient developmental tasks (Galambos et al., 2005; Masten et al., 2004; Schulenberg & Zarrett,

in press). For example, Galambos et al. (2005) found that, on average within individuals, depressive symptoms and expressed anger decreased and self-esteem increased across emerging adulthood. Within-persons, increased social support, becoming married, and fewer months of unemployment contributed to gains in well-being. Likewise, Aseltine and Gore (1993) found that depression declined after high school and relations with friends and family improved. In particular, positive relations with family predicted declines in depressed mood. Furthermore, there was less stability in depression after leaving high school, especially for those high in depression in high school. That is, in high school, prior levels of depression were strong predictors of subsequent depressive symptoms, but this was not the case after leaving high school. These results suggest that the source of change in well-being in emerging adulthood lies in changing salient person-context interactions associated with the transition to adulthood.

While well-being increases on average across emerging adulthood, the prevalence rates of many mental health problems peak during this period, relative to the other periods in the lifespan (Statistics Canada, 2002, 2003). That is, the transition to adulthood results in altered person-context relations that for some may contribute to compromised well-being—evidence for diversity in well-being. Indeed, a developmental psychopathology perspective follows from developmental systems theory, holding that the development of behavioural and emotional disturbances arise from the same principles that govern normal development, person-context interaction (Sroufe, 1997). Developmental transitions can contribute to alterations in the course of well-being and the manifestation or consolidation of psychopathology (Schulenberg et al., 2004). Transitions may contribute to cumulative or simultaneous experience of stressors that

together, may exceed or overwhelm the coping resources of some individuals; transitions may alter the match between individual needs and contextual resources; and/or transitions may exacerbate ongoing risks, accentuating preexisting problems. Conversely, transitions may provide opportunities for increased well-being through successful adaptation. Understanding how individuals navigate or adjust to developmental transitions is at the crux of understanding risks for negative outcomes and requires the study of person-context interactions (Graber, 2004; Graber & Brooks-Gunn, 1996; Maggs et al., 1997).

### *Binge Eating and the Transition to Adulthood*

In line with a developmental systems perspective, Attie and Brooks-Gunn (1992) suggested that the emergence of eating problems in late adolescence and in emerging adulthood does not result from a single process but rather from complex relations among systems. More specifically, Connors (1996) proposed that eating problems likely result from the interaction between vulnerabilities and difficulties in regulating emotions. The vulnerability model holds that risk factors relevant to eating problems in adolescence, including internalization of body ideals (e.g., thin body ideal for women) and body dissatisfaction, are precursors for eating problems (Connors, 1996; Smolak & Levine, 1996; Striegel-Moore, 1993). The emotion regulation model holds that self-regulatory difficulties contribute to binge eating (Connors, 1996; Polivy & Herman, 1993). However, integration and explicit exploration of how these models operate in the face of transitional challenges is lacking, despite the fact that emerging adulthood is seen as a period of increased risk for eating problems. Developmental researchers have speculated that the emergence of eating problems in adolescent women may represent a mode of psychological accommodation to transitional challenges (Attie & Brooks-Gunn, 1992;

Smolak & Levine, 1996). Indeed, the modal age of onset for bulimia nervosa is 18 years in clinical samples and a few years later in community samples (Striegel-Moore, 1993). The vast majority of bulimia nervosa cases emerge between the ages of 18 and 25 years (Smolak & Striegel-Moore, 1993; Steiger et al., 2003). To support the argument that an integrated model is needed, the following sections outline literature on vulnerabilities and emotion regulation followed by literature on eating problems and adjustment to university.

*Vulnerability Model*

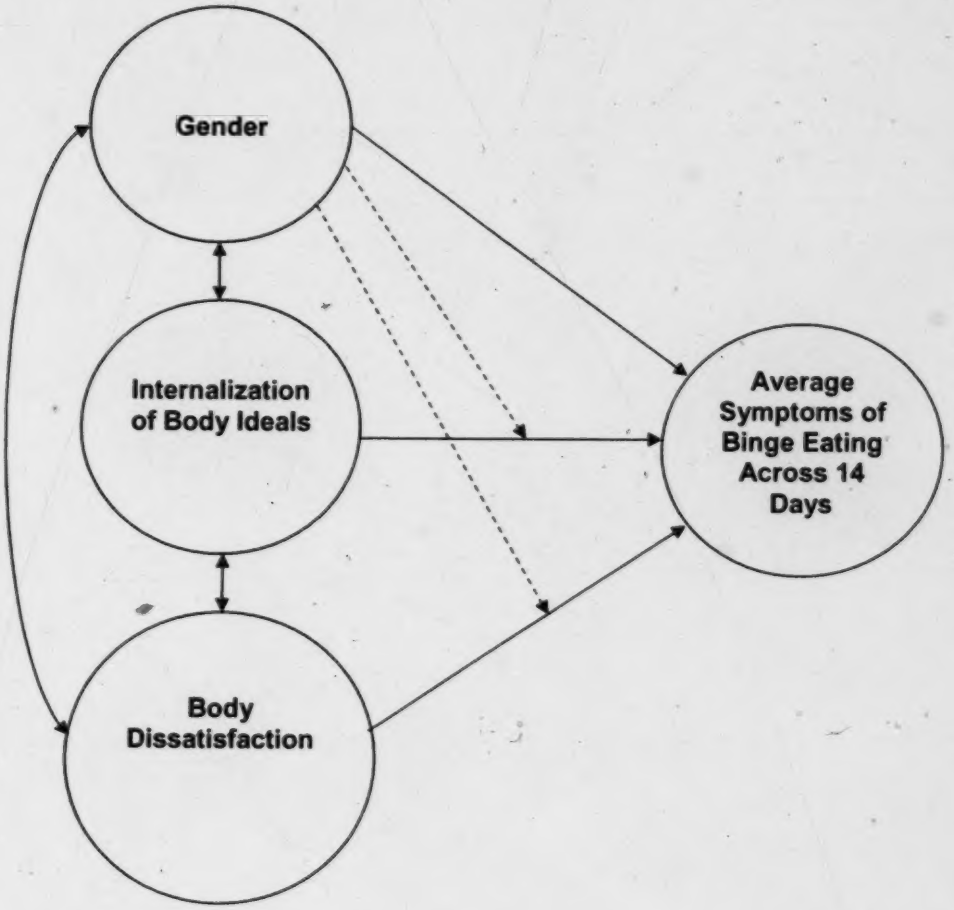
A vulnerability is a predisposition or susceptibility to negative outcomes when one is faced with stressful conditions (Engle, Castle, & Menon, 1996). Rutter (1993) argues that in relation to life changes and transitions, individuals showing emotional and/or behavioural problems are more vulnerable to the demands of the transition and thus are at greater risk for negative outcomes. Risk factors for eating problems that typically emerge in adolescence might be vulnerabilities that, when combined with challenges of the transition to adulthood and university, increase risk for binge eating.

In two recent and comprehensive reviews of the literature on risk factors for eating problems gender, internalization of body ideals (e.g., thin body ideal for women), and body dissatisfaction were identified as individual vulnerabilities. In Stice's (2002) meta-analysis, methodologically rigorous studies were reviewed in order to permit strong inferences about etiological factors for eating problems. Included were experimental, quasi-experimental, and prospective studies that tested whether factors thought to be risks for eating problems predicted subsequent onset of eating pathology or increases in eating disorder symptoms. Internalization of body ideals was a risk factor for bulimic pathology

and maintenance factor for bulimia pathology. Body dissatisfaction was a risk factor for general eating pathology and a maintenance factor for bulimic pathology and was identified as one of the most robust and consistent risk and maintenance factors for eating pathology. In the second review, Jacobi, Hayward, de Zwaan, Kraemer, and Agras (2004) classified risk factors into several categories and then explored the probability that persons with an eating disorder would score higher on each risk factor. Gender was classified as a highly potent fixed marker—a risk factor that cannot be changed—due to the consistent finding that the majority of individuals with eating disorders are female. The construct called "weight concerns," under which negative body image and body dissatisfaction were subsumed, was classified as a very potent well-supported variable risk factor (a risk factor that can change) based on findings from longitudinal research. Gender, internalization of body ideals, and body dissatisfaction have been identified as risk factors in other reviews of the literature (e.g., Stice, 2001b; Walcott, Pratt, & Patel, 2003). Figure 1 depicts the associations between female gender, internalization of thin body ideal, and body dissatisfaction with binge eating. Each vulnerability is discussed in the following sections.

*Gender.* Established gender differences in eating problems have been linked to gender roles (Smolak & Murnen, 2001; Smolak & Striegel-Moore, 1996). Gender roles are shared cultural expectations about appropriate behaviours for the sexes (Galambos, 2004; Smolak & Murnen, 2001). Gender-role socialization theories look for explanations for eating problems, particularly in women, in socialization practices. These practices promote the acceptance of stereotypical feminine roles and may make females vulnerable to body dissatisfaction and eating problems (Heinberg, 1996). The gender intensification

Figure 1. *Vulnerability model of associations between gender, internalization of body ideals, body dissatisfaction and average symptoms of binge eating and moderating effects of gender.*



hypothesis holds that differences between boys and girls increase with age as a result of socialization to conform to stereotyped masculine and feminine roles. These stereotypes are often represented in mass media and often equate being thin with success, creating what has been called a culture of thinness (Galambos, 2004; Heinberg, 1996; Smolak & Murnen, 2001). In addition for girls, orientations to interpersonal relationships and beauty are central to feminine gender-role stereotypes (Striegel-Moore, 1993). In a study of representations of adolescents in two popular teen magazines, *Seventeen and YM*, Durham (1998) found that a gendered sexuality was presented to adolescent girls. Hetero-erotic ideals of beauty—making one's self beautiful for the sole purpose of attracting the attention of boys—was presented in the advertising and featured articles in these magazines. The author speculated that these ideals work to socialize girls into traditional feminine gender roles as objects of male desire. In a meta-analytic review, Murnen and Smolak (1997) examined the links between gender roles and eating problems. Among eating disordered groups, mean femininity scores were significantly higher than in control groups. The eating disordered groups also had lower masculinity scores. Gender-role socialization may be an underlying reason for significantly higher rates of eating problems and eating disorders in females, about 10 to 1 for females compared to males (APA, 1994; Steiger et al., 2003). Based on these findings, female gender is presented as a vulnerability that predicts binge eating in Figure 1.

*Internalization of body ideals*. One of the mechanisms through which these stereotypes and ideals are thought to contribute to eating problems is internalization of pressure to be thin communicated in popular media, by peers, and family (Striegel-Moore, 1993). Internalization of body ideals implies that an individual is aware of the

standard and believes that achieving the standard is important for him or herself (Smolak & Murnen, 2001). Cusumano and Thompson (1997) found that awareness and internalization of sociocultural ideals portrayed in popular teen and women's magazines (e.g., *YM, Seventeen, Cosmopolitan, Woman's Day*) significantly predicted body dissatisfaction, appearance evaluation, restrictive eating, and low self-esteem. They found no relation between mere exposure to body ideals and these measures. Rather, internalization of these ideals accounted for significant variance in each measure after controlling for awareness. Using structural equation modeling, Stice, Schupak-Neuberg, Shaw, and Stein (1994) showed that in a sample of undergraduate females (mean age 20) media exposure predicted eating disorder symptoms directly, but this relation was mediated by gender-role endorsement and internalization. Media exposure predicted gender-role endorsement, which predicted internalization of the thin body ideal, which in turn predicted body dissatisfaction. Similarly, Stice (2001a) found that over a 20-month period, adolescent girls who reported feeling more pressure to be thin and internalization of body ideals reported more body dissatisfaction which predicted dieting and negative affect.

In a recent meta-analytic review of the effect of experimental presentation of thin media images on body dissatisfaction, effect sizes indicated that, for women, body dissatisfaction increases after viewing images of thin models, compared to images of averaged sized or larger models or inanimate objects (Groesz, Levine, & Murnen, 2002). Heinberg and Thompson (1995) found that these associations were stronger for females who internalized body ideals and who had eating problems. College-aged female participants viewed television commercials of either appearance-related content (e.g.,

advertising diet supplements) with thin attractive models or non-appearance commercials (e.g., advertisements for products not related to physical appearance) with models considered average to above-average weight. Results showed that participants who initially reported high levels of bulimic symptoms reported significant increases in depressive symptoms and body dissatisfaction from pre-test to post-test when they viewed appearance-related commercials. Women with high levels of awareness and internalization of body ideals who viewed appearance-related commercials had elevated depressive symptoms and anger from pre-test to post-test.

Although most research on internalization of body ideals has been conducted with female samples, media messages promoting a muscular physique for boys and men (e.g., *Men's Health* magazine) have become more common in recent years (Alexander, 2003). Morry and Staska (2001) found that in a sample of introductory psychology students, internalization of body ideals mediated the relations between reading beauty magazines and body dissatisfaction and problem eating for women. For men, internalization mediated the relation between reading fitness magazines and body dissatisfaction only. Likewise, in a large sample of 7$^{th}$ though 10$^{th}$ grade boys and girls, Jones, Vigfusdottir, and Lee (2004) found that internalization mediated the effects of appearance magazine exposure, and appearance conversations with friends for girls. Reading fashion magazines and talking to friends about appearance predicted increased internalization of thin body ideals, which in turn predicted body dissatisfaction. Likewise, for boys, the relation between appearance conversation and body dissatisfaction was mediated by internalization. Furthermore, for boys, internalization mediated the association between criticism from peers about appearance and body dissatisfaction, but also had a direct

effect on body dissatisfaction. It may be that young women and young men who internalize gender-specific body ideals are at greater risk for eating problems. Therefore, it is important to examine binge eating in males, despite the overrepresentation of females with eating disorders. In Figure 1, a solid line depicts the positive association between internalization of body ideals and binge eating. The dashed line depicts the possibility that female gender might moderate this association.

*Body dissatisfaction*. Body dissatisfaction is the affective component of the multidimensional construct of body image. Other components of body image include preference for thinness, fear of fatness, actual body size, ideal body size, and body-size distortion (Gleaves, Williamson, Eberenz, Sebastian, & Barker, 1995). Stice (2001a) found that over time, in a sample of adolescent females, internalization of a thin body ideal predicted increased body dissatisfaction. Jones (2004) found that for both adolescent girls and boys, internalization predicted increases in body dissatisfaction over a 1-year period. Some research suggested that early body dissatisfaction may be a necessary although not sufficient predictor of later eating pathology (Leon, Fulkerson, Perry, & Cudeck, 1993). Correlational studies have revealed consistent associations between body dissatisfaction and eating disturbances for girls (e.g., Leon et al., 1993; Leung, Schwartzman, & Steiger, 1996; Thompson, Coovert, & Stormer, 1999) and longitudinal results indicate that girls' body dissatisfaction in early adolescence is predictive of later eating problems (Attie & Brooks-Gunn, 1989; Graber et al., 1994). In a two-year longitudinal study of girls in grades 7 through 10, Attie and Brooks-Gunn (1989) revealed that only body image problems (and not pubertal status, family influences, or depressive symptoms) predicted increases in the emergence of eating

problems. Girls who felt more negatively about their bodies in early adolescence were more likely to develop subsequent eating problems when physical maturation, psychopathology, and family relationships were held constant. Ohring, Graber, and Brooks-Gunn (2002) found that recurrent body dissatisfaction in adolescence was associated with elevated depressive and eating symptoms in emerging adulthood (at age 22). Cooley and Toray (2001) found that figure dissatisfaction predicted bulimia symptoms three years later in a sample of freshmen females, controlling for initial symptoms; women entering college with higher levels of body dissatisfaction showed worsening patterns of eating problems across their first three years of college. These findings implicate body dissatisfaction as important in the development of later eating problems for girls and young women.

Although girls and women consistently report greater body dissatisfaction on average compared to boys and men, boys also experience body dissatisfaction, often related specifically to weight (Rosenblum & Lewis, 1999). Results indicate that boys and young men are often dissatisfied with their weight when they are underweight (Furnham & Calnan, 1998) and that wanting to weigh more is likely related to wanting to look more muscular (Abell & Richards, 1996). In relation to eating pathology, Furnham and Calnan (1998) found that late adolescent males who indicated that they were exercising to tone their bodies (i.e., to increase muscle definition) had higher problem eating scores than males exercising to lose weight or for enjoyment. Results from the McCreary Centre Society (1999) showed that among over 28,000 7$^{th}$ to 12$^{th}$ graders in British Columbia, girls were more likely to feel overweight, whereas boys were about equally likely to feel overweight as underweight. Among adolescents whose weight was judged healthy, 80%

of girls wanted to lose weight and 60% of boys wanted to gain weight. As with internalization of body ideals, young men who are dissatisfied with their bodies may be at risk for eating problems. In Figure 1, body dissatisfaction is presented as a vulnerability that predicts binge eating and the dashed line proposes that gender might moderate this association.

This review of the literature reveals that the vulnerabilities of gender, internalization of body ideals, and body dissatisfaction are interrelated. These connections are noted in Figure 1, however, the causal ordering of these variables is not the focus of the current study. Rather it is assumed that internalization of body ideals and body dissatisfaction develop in adolescence, prior to the transition to adulthood and are person variables or vulnerabilities that might interact with the university transition context to contribute to binge eating. There is a large literature linking these vulnerabilities to contextual influences in adolescence, including family and peer contexts (e.g., Barker & Galambos, 2003; Jones, 2004), and at least in the case of body dissatisfaction these factors are related to later eating problems. However, what is missing from this literature is an exploration of how these vulnerabilities operate in interaction with the transition to adulthood, and specifically the transition to university to contribute to eating problems.

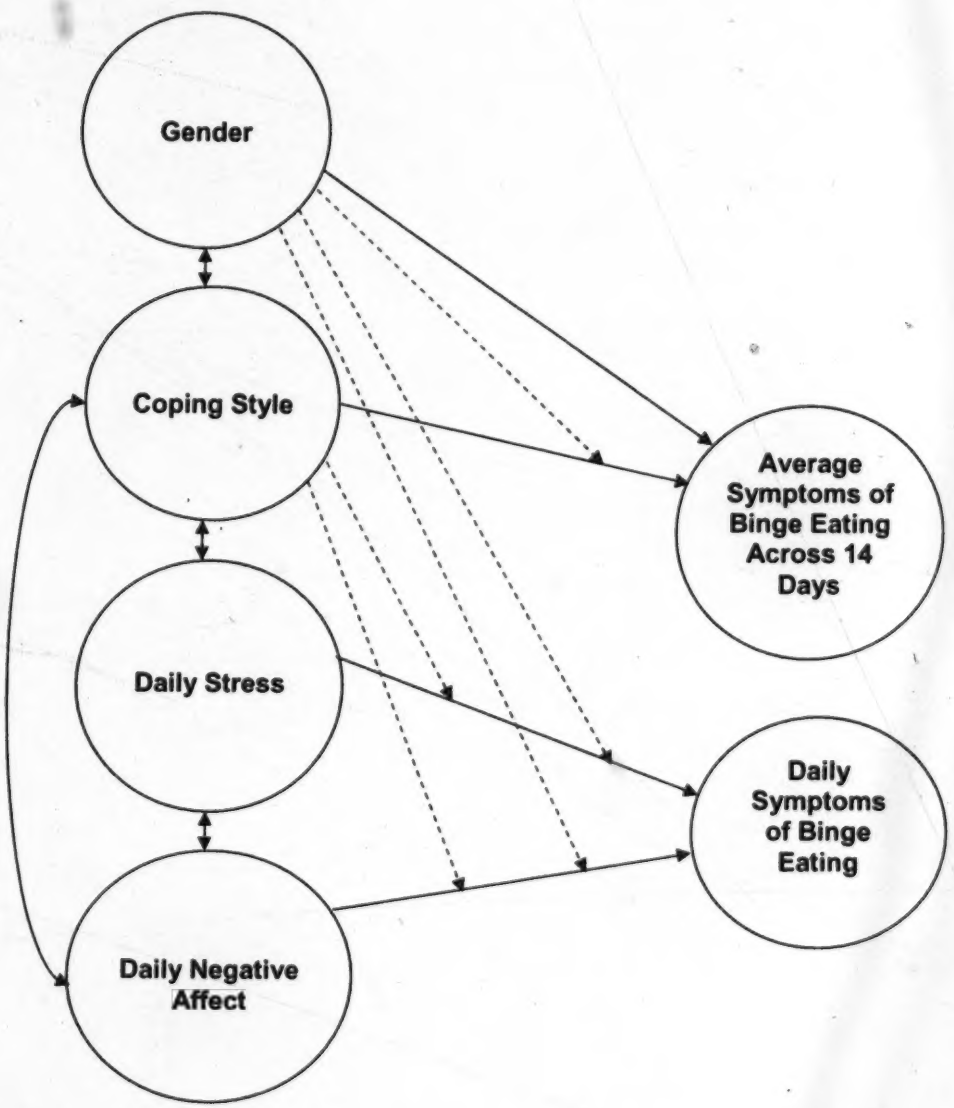
*Emotion Regulation Model*

Vulnerabilities may interact with emotion regulation processes during the transition to adulthood to result in eating problems for some individuals. Several related models have outlined the contribution of stress, negative affect, and coping to binge eating behaviour (see Polivy & Herman, 1993). All generally hold that people who binge

eat do so to reduce stress and/or negative affect, which in turn reinforces and maintains binge eating behaviour (Polivy & Herman, 1993). General coping styles and behaviours that focus on negative emotions or avoid problematic situations are related to eating problems (e.g., Koff & Sangani, 1997). Figure 2 presents these associations in a model wherein stress, negative affect, and coping style predict binge eating, and coping style moderates the associations between stress and negative affect and binge eating. In the following section, each element of the model is discussed in turn.

*Stress.* Stress encountered during transitions is part of ongoing development and includes normative daily stresses or hassles and major events (Compas, Orosan, & Grant, 1993). The cognitive appraisal definition of stress holds that the significance of stressful experiences for individual well-being lies in an individual's perception or appraisal of a stressful experience (Lazarus & Folkman, 1984). Research indicates that stress may be related to binge eating through appraisal processes. For example, Hansel and Wittrock (1997) found that undergraduate females who binge ate appraised tasks as more stressful than a control group. Specifically, participants in the binge group rated low-stress and high-stress anagram tasks and videotaped interpersonal interactions as more stressful than the control group. These findings correspond to those of another study that revealed a significant difference between participants in a binge eating group versus a control group in perceived stressfulness of daily hassles. Participants in the binge eating group rated daily hassles as more stressful, despite the fact that there was no significant difference between the groups on average frequency of daily hassles across 14 days. Furthermore, the binge eating group consumed more calories on high hassle days versus low hassle

Figure 2. *Emotion regulation model of within-person associations of daily stress, daily negative affect and daily symptoms of binge eating, between-person associations of coping style and average symptoms of binge eating, and moderating effects of coping style and gender.*



days (Crowther, Sanftner, Bonifazi, & Shepherd, 2001). Stice (2002) noted that although stress has not been established as a risk factor for eating problems in prospective studies, it may be related to disordered eating symptomology more proximally. That is, stressful life events may not predict eating problems years down the line, but rather day-to-day experiences of stress may contribute to eating problems. Indeed, Denisoff and Endler (2000) found that number of stressful life events in the previous year was not related to current weight concern among university-aged females. In Figure 2, perception of daily stress is depicted as predicting daily binge eating. On days participants report increased stress, symptoms of binge eating are expected to increase. Stice (2002) also noted that proximal associations between stress and binge eating may be related to other proximal factors such as negative affect.

*Negative affect.* Negative affect refers to the experience of negative or aversive mood, including for example, feelings of sadness, irritability, and guilt (Watson & Clark, 1997). Often negative emotions accompany experiences of stress (Lazarus, 1999). Lazarus (1999) argues that stress and emotion are interdependent and studying both together increases our understanding of adaptation. In his recent meta-analytic review, Stice (2002) concluded that negative affect is a prospective risk factor for eating pathology and a causal maintenance factor for binge eating (proximal risk factor) among individuals with an eating disorder. Using a random regression growth curve model, Stice (2001a) found that negative affect predicted a significant increase in bulimic symptoms among female adolescents over a 20-month period. Stice, Akutagawa, Gaggar, and Agras (2000) found that both dieting and negative affect predicted the onset of binge eating, for females but not males in a sample of high school seniors across nine months. Stice (1998)

found cross-time and contemporaneous correlations between negative affect and bulimic pathology in a sample of high school senior females. Tyrka, Waldron, Graber, and Brooks-Gunn (2002) found that negative emotion at ages 12 to 16 years predicted the onset of bulimia eight years later, in emerging adulthood.

Experimental, intensive repeated measures, and experience sampling designs have also been used to study the proximal relation between mood and binge eating. Polivy and Herman (1999) found that compared to unrestrained eaters, restrained eaters (i.e., dieters) were more likely to attribute negative feelings induced by failure at an experimental task to eating ice cream following the task rather than to the task itself. These results partially supported the masking hypothesis of binge eating wherein negative feelings are misattributed to overeating, rather than to the actual source of these negative feelings (e.g., stressful experience). Among female undergraduate students with bulimia or who binge ate, Rebert, Stanton, and Schwarz (1991) found significant positive correlations between average levels of negative mood (e.g., depression, anxiety, and hostility) and binge eating across a 20-day period. Sanftner and Crowther (1998) found greater variability in negative affect, shame, and guilt over seven days in a sample of female university students who binge ate compared to those who did not. Greater variability in negative emotions may be indicative of emotion regulation difficulties for participants who binge eat. Using ecological momentary assessment with a sample of female undergraduate students who binge ate, Wegner et al. (2002) found that participants reported higher levels of negative affect on binge days compared to non-binge days. There was no significant difference between mood ratings when participants were prompted 30 to 60 minutes before a binge compared to ratings at prompts 30 to 60

minutes after a binge. However, when participants experienced a binge they were asked to rate their mood as soon as possible following the binge. Results indicated that in the immediate context of binge eating, post-binge mood was rated worse than pre-binge mood. Similarly, Steiger, Gauvin, Jabalpurwala, Séguin, and Stotland (1999) used an experience sampling method to explore differences between pre- and post-binge mood among females with bulimia. Mood did not differ at pre-binge sampling occasions compared to mood reported on non-binge days, but mood was significantly worse for post-binge than pre-binge ratings. In a study that compared patients with Bulimia Nervosa to patients with Panic Disorder and a healthy control group, Alpers and Tuschen-Caffer (2001) found that hourly ratings of negative affect and desire to eat were more strongly correlated for bulimia patients than for the other two groups. Furthermore, bulimia patients had elevated negative mood in the hour before binging compare to the rest of the day. These results demonstrate that there is a consistent within-day association between negative affect and binge eating and that negative affect is likely greater after the binge episode. As with stress, a solid line in Figure 2 depicts the positive association between the daily experiences of negative affect and binge eating.

*Coping.* Coping behaviour regulates stress and emotion (Lazarus, 1999). Two commonly accepted ways of coping are problem-focused coping, whereby information about how to address the stressful situation is gained and action is taken to master or change the stressful situation, and emotion-focused coping, whereby regulation of emotions is attempted through cognitive or behavioural efforts, without changing the situation (Bridges, 2003; Lazarus, 1999). A third general way of coping is avoidance; behaviours or cognitive changes are engaged to avoid the situation via distraction or

social diversion (Endler, 1997). A further distinction is made between coping styles and coping strategies. Coping styles are generalized or typical ways of coping exhibited across varying contexts. They can be considered person variables that act in transaction with situational stressors to instigate coping reactions. Coping styles are related to personality styles and mental health outcomes (Bridges, 2003; Endler, 1997; Lazarus, 1999). Coping strategies, on the other hand, are behaviours or cognitions exhibited in response to specific situations (Bridges, 2003; Lazarus, 1999). Long-term positive adaptation is associated with a predominance of problem-focused coping, especially when situations are controllable—competence is enhanced through mastery of stressful situations (Bridges, 2003; Compas et al., 1993; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001).

In a recent review by Jacobi et al. (2004) maladaptive coping style was identified as a risk factor for eating problems. Ball and Lee (2002) found in a sample of women in emerging adulthood (ages 19 to 24) strong concurrent associations among ineffective coping strategies, eating problems, stress, and weight dissatisfaction. In a university sample, Koff and Sangani (1997) found that disordered eating symptoms were positively correlated with emotion-oriented coping style (e.g., feeling guilty and angry) and distraction-oriented coping style (a form of avoidance coping e.g., watching TV, shopping). As well, body dissatisfaction, body size distortion and negative body image were positively correlated with emotion-oriented coping style. Denisoff and Endler (2000) found similar results. Emotion-oriented and distraction coping were related to weight preoccupation in a sample of university females. In a clinical sample, Troop, Holbrey, and Treasure (1998) reported that participants with bulimia were more likely to

blame themselves for problems than those with anorexia or participants in the control group.

Experimental studies have also revealed links between coping styles and eating problems. In the study by Hansel and Wittrock (1995), participants in the binge eating group compared to controls reported more positive coping strategies when faced with stressful tasks, but also reported more catastrophizing, especially following the interpersonal task. Participants in the binge eating group also reported more catastrophizing over the course of one week of monitoring daily stressful events. Likewise, Bittinger and Smith (2003) reported that participants with high problem eating scores also had higher emotion-oriented coping scores. In response to stressful food/body image videotaped situations, participants with high problem eating scores reported that if faced with the same situation they would use more emotion-oriented coping strategies than participants with low problem eating scores. Furthermore, stress response mediated this association. The more stressful the situation was rated, the more likely participants with high problem eating scores were to report that they would use emotion-focused coping strategies to cope with such a situation. In Figure 2, a solid line represents the association between coping style and binge eating. Emotion-oriented and avoidance-oriented coping styles are expected to predict increased symptoms of binge eating.

In line with Lazarus' (1999) argument that coping, stress, and emotion are interrelated, recent daily diary research has explored the connections among stress, negative affect, and coping as predictors of eating problems. Wolff et al. (2000) compared female university students who binge ate and those who did not on daily experiences of stress, coping, and mood. Across a three-week period, participants in the

binge eating group reported greater frequency of stressful events and greater impact of those events, more negative affect and less positive affect, and used avoidance coping strategies more often than participants in the control group. Within the binge group, the impact of stressful events was rated higher and negative affect was elevated on binge days compared to non-binge days. The number of coping strategies used did not differ on binge days compared to non-binge days. Freeman and Gil (2004) explored 30-day daily diary data from a sample of undergraduate women who self-identified as binge eating two to three times per month. Greater depressed affect and greater psychological stress were associated with binge eating later the same day and distraction coping was positively related to same-day binge eating as well as next-day binge eating. Depressed affect and stress did not predict next day binge eating. The results of these studies demonstrate that stress and negative affect covary with binge eating and correspond with cross-sectional and experimental findings suggesting that individuals who binge eat may use more ineffective coping strategies in general. Although the relations between daily coping and binge eating were explored in these studies, interactions between general coping style and daily experiences of stress and negative affect have not been examined as predictors of binge eating. These interactions are presented in Figure 2. Dashed lines indicate possible moderating effects of coping style on the daily associations between stress and binge eating and negative affect and binge eating.

The literature reviewed on stress, negative affect, and coping reveals that emotion regulation processes are related to eating problems both between individuals, as found in experimental and cross-sectional studies, and within-persons, as found in daily diary studies. Considering that all of the literature reviewed was conducted with females,

gender is included in this model as a possible moderator of the associations between stress, negative affect, coping and binge eating (see Figure 2). Although an explicit transition to university variable is not included in the model, testing the model in a sample of emerging adults making the transition to university will help clarify how emotion regulation processes contribute to eating problems during this transition.

*Transition to University and Eating Problems*

It has been suggested that challenges experienced during the transition to university might contribute to eating problems for vulnerable individuals (Dickstein, 1989). Myriad studies have explored the contribution of vulnerabilities and emotion regulation variables to eating problems with university samples, usually in separate strands of research, but little research has explicitly focused on whether adjustment to university contributes to the development of eating problems. As Smolak and Levine (1996) point out, interest in developmental transitions is more than a simple extension of emotion regulation models. Rather, normative change and the way in which adaptive coping facilitates development is emphasized (Smolak & Levine, 1996).

What do we know about the relation between the transition to university and eating problems? Vohs, Heatherton, and Herrin (2001) conducted the only study to follow adolescents from high school to university with the intent of exploring change in eating problems. High school students entering a particular college were sent surveys in the spring, before graduation, and then equal thirds of participants were re-assessed in the fall, winter, and spring of their first year at university. Results showed that participants were less satisfied with their bodies in college compared to high school, there was a slight increase in average weight (1.73kg), and dieting decreased. However, no difference in

eating disorder classification was found. Similarly, Cooley and Toray (2001) found that measures of eating pathology were quite stable across the first three years of college.

Other researchers have found different results when changes in symptoms of eating problems have been explored. Striegel-Moore et al. (1989) conducted one of the only other longitudinal studies aimed at exploring development of eating problems in university samples. Approximately 1000 first-year students completed surveys in their first week and again in the last month of their first year. At Time 1, 2% of males and 4% of females were classified as probable bulimia cases. Over the course of the year, three new cases emerged among females; all had subclinical levels of bulimic symptoms at Time 1. However, in terms of symptom frequency, among females, 15% started binge eating over the year and 33% reported binge eating at both times. Among males, 10% started binge eating and 7% reported binge eating both times. Four percent of females started purging over the year and 9% reported purging at both times. For males, the corresponding percentages were 1% and 0.3%. Changes in weight satisfaction over the year, and stress (reported at Time 2) contributed to worsening of symptoms. Discriminant function analysis showed that changes in weight satisfaction and stress, along with declines in perceived attractiveness, increases in body weight, and increased feelings of ineffectiveness discriminated the worsening group from the stable groups. In line with findings that symptoms of eating problems emerge during the transition to university, Pyle, Neuman, Halvorson, and Mitchell (1991) found in a large sample of female and male freshmen students that 5% of females and 0.4% of males met the criteria for an eating disorder. Among females who were not classified as having bulimia, 25% reported binge eating at any frequency, and 7% reported binge eating more than weekly.

Furthermore, many weight control behaviours were reported (23% reported 24-hour fasts, 7% diet pills, 6% vomiting). Fifty-one percent reported eating due to stress. This figure was close to 90% for students with bulimia. These students also reported significant social and work related impairment, indicators of poor adjustment to the university context.

In an interesting study, Schwitzer, Rodriguez, Thomas, and Salimi (2001) explored correlates of eating problems by reviewing the records of 130 college female students who accessed a university eating disorders intervention program during a 6-year period. Students ranged in age from 17 to 24 years. Based on their records, 83% had moderate eating concerns, 79% reported binge eating, 13% severely restricted eating, 17% vomiting, and 5% laxative use. In addition, 75% reported moderate stress and 43% moderate depression. Thirty-five percent reported moderate concerns about pressure to succeed academically, although less than 1% actually had difficulties. Twelve percent stopped attending counselling because the severity of the problem required them to withdraw or seek intensive treatment off-campus.

These studies suggest that symptoms of eating disorders, such as binge eating, may emerge for some students during the transition to university and may be related to adjustment problems, however, none explored this connection explicitly. The university experience has been characterized as an intensive preparatory socialization process wherein new academic and social demands are negotiated (Montgomery & Côté, 2003; Tinto, 1993). These demands are often stressful (Sherrod et al., 1993). A University of Alberta study (Student Counselling Services, 2003) showed that in both 1995 and 2001, at least 90% of students surveyed reported that adjusting to university was a stress-related

concern. For about one third of these students adjusting to university was highly stressful. Getting bad grades is a stress-related concern for most students at the University of Alberta (90%) and is very stressful for the majority of these students (70%; Student Counselling Services, 2003). Statistics Canada's Youth in Transition study (Bowlby & McMullen, 2002) showed that almost one quarter of students who left post-secondary education before completing their degree reported having had trouble keeping up with their workload most or all of the time.

Adjusting to new relationship demands (with parents, peers, instructors) also contributes to stress (Gerdes & Mallinckrodt, 1994; Tinto, 1993). Parker et al. (2002) found that successful students, compared to those with low GPA and those who dropped out after their first year, scored higher on emotional intelligence. This construct included abilities to recognize emotions in the self (intrapersonal) and others (interpersonal), adjust one's emotions and behaviours (adaptability), and control one's emotions (stress management). Woosley (2003) found that students with higher social adjustment ratings in the first two weeks of college were more likely to complete their degree within 5 years compared to students with poorer social adjustment early on. Indeed, academic as well as personal and social adjustment play important roles in retention (Gerdes & Mallinckrodt, 1994; Tinto, 1993).

Successful adjustment to university likely contributes to well-being, but poor adjustment may contribute to general psychological distress, somatic distress, anxiety, depression, and health-risk behaviours, like binge eating (Gerdes & Mallinckrodt, 1994; Tinto, 1993). Wintre et al. (2000) found that increases in stress predicted increases in depression over the course of the first year of university. Brooks and DuBois (1995)

found that mental health problems (e.g., anxiety, depression) were predicted by a number of factors including lower standardized entrance exam scores, lower problem solving coping scores, increased emotional instability, and more daily hassles. Tao, Dong, Pratt, Hunsberger, and Pancer (2000) found that anxiety and depression increased over the course of the first term, but when social support increased (which may be related to better social adjustment), depression and anxiety decreased. Halamandaris and Power (1999) found that students who had lower scores of overall adjustment to university also had the lowest happiness scores and social support scores compared to the students with moderate and high adjustment scores. Aspinwall and Taylor (1992) found that positive mood, higher optimism, and active coping reported at the beginning of first term predicted positive college adjustment at the beginning of second term. Avoidant coping predicted worse adjustment. For women, negative mood and avoidant coping at Time 1 predicted poor self-reported health at Time 2. The association between negative mood and poor adjustment was mediated by greater use of avoidant coping and partially offset by use of active coping and support seeking.

These results show that stress experienced during the transition to university might contribute to binge eating behaviours via emotion regulation processes. Macht, Haupt and Ellgring (2005) found that exams were associated with increased emotional stress and reports of eating to distract one's self. Mitchell and Mazzeo (2004) found that depression and anxiety predicted eating problems in college women, but not in men. Vulnerabilities might also be important and interact with emotion regulation processes. Using structural equation modelling with a female university sample, Tylka and Subich (2004) found support for a model wherein negative affect predicted body image

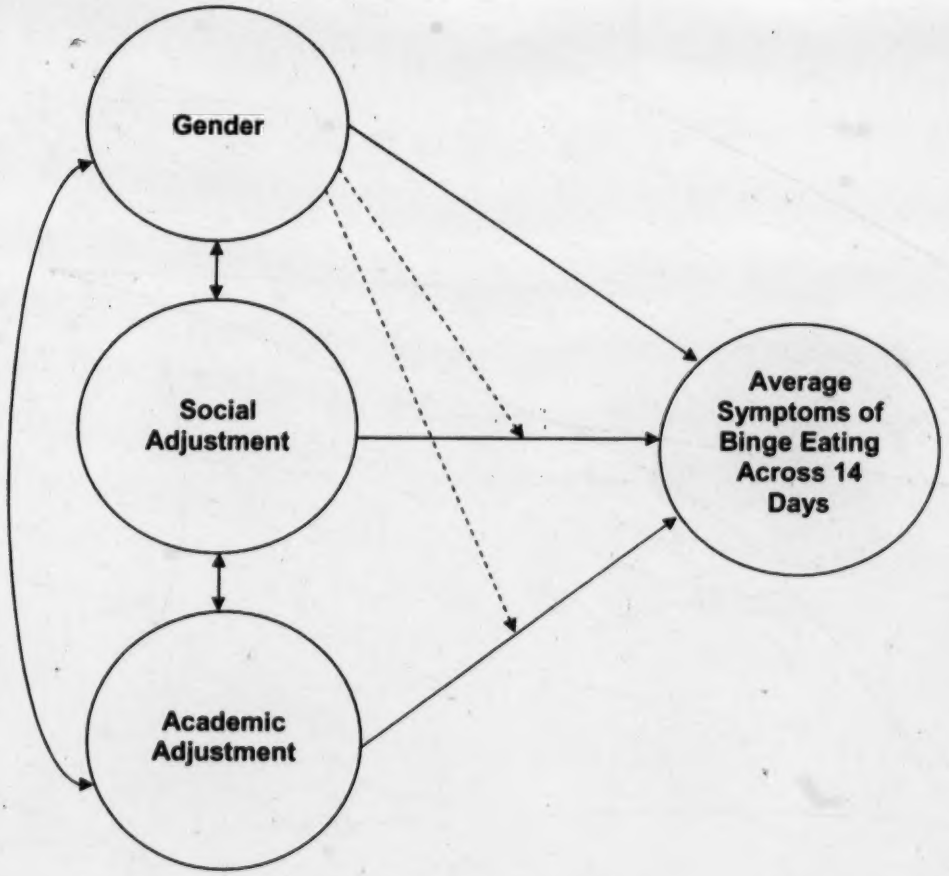
disturbance which in turn predicted eating problems. As well, low social support predicted increased negative affect and negative affect predicted internalization of thin body ideals, which predicted body image disturbance.

Academic and social adjustment problems might compromise well-being because achievement tasks (education and work goals) and affiliation tasks (peer and romantic involvement) are key developmental tasks of emerging adulthood that connect individuals to future roles (Schulenberg et al., 2004). Roisman, Masten, Coatsworth, and Tellegen (2004) showed that success at developmental tasks in emerging adulthood, including academic and social success, was associated with work and romantic competence 10 years later. Schulenberg et al. (2004) found similar results; succeeding in work and education contributed to increases in well-being across emerging adulthood. Successes are likely to accumulate, but turning points or changes in previous direction are also possible during emerging adulthood (Schulenberg et al., 2004). Poor academic or social adjustment may provide the impetus for a negative turning point or the onset of health-risk behaviours such as binge eating. This model is depicted in Figure 3 wherein poor social and academic adjustment predict binge eating. As in the vulnerability model and affect regulation model, gender is included as a possible moderator of these associations.

*An Integrative Model*

How can we best understand binge eating that occurs during the transition to university? It is evident from the literature reviewed that vulnerabilities are important risk factors for eating problems and that emotion regulation difficulties are related to binge

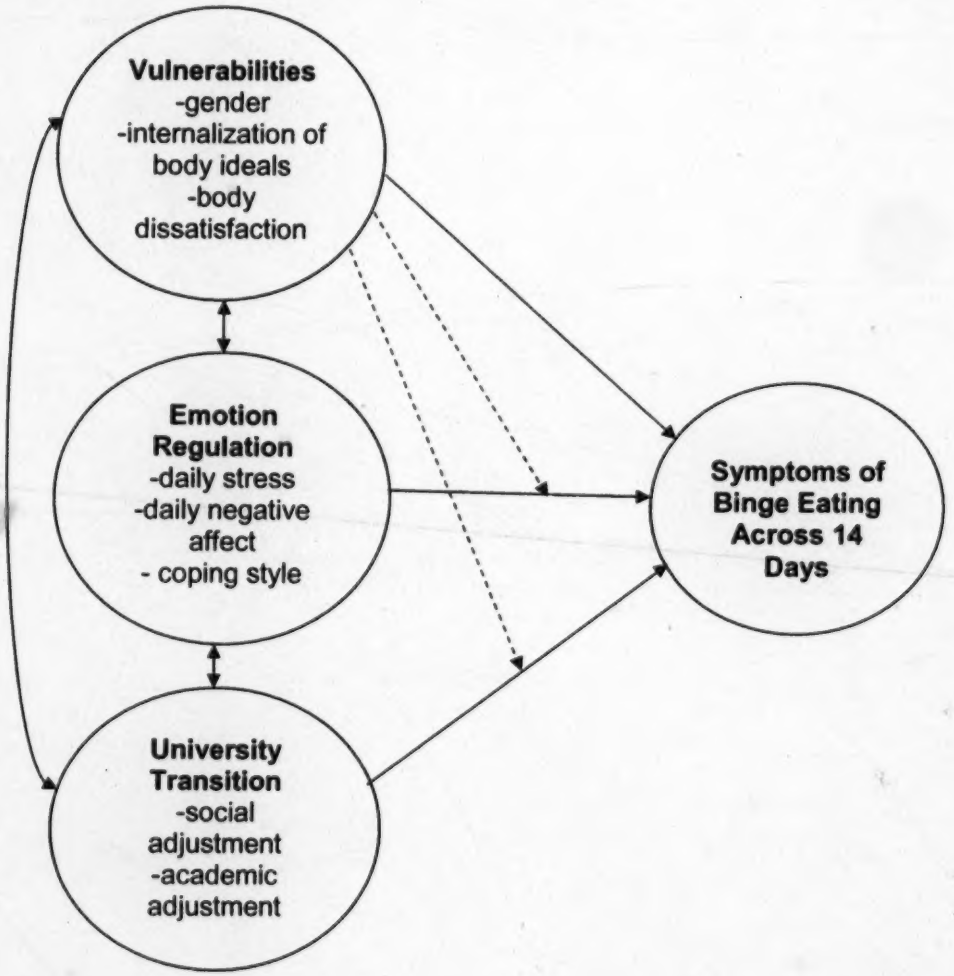
Figure 3. *University adjustment model of associations between social adjustment, academic adjustment and average symptoms of binge eating and moderating effects of gender.*



eating in particular. Although it has been suggested that the emergence of eating problems results from the combination of vulnerabilities and affect regulation problems, the literature is lacking empirical tests of such integrative models (e.g., Attie & Brooks-Gunn, 1993; Connors, 1996; Smolak & Levine, 1996). Furthermore, although much research has been conducted with university samples and although the university experience is thought to contribute to eating problems (e.g., Dickstein, 1989; Striegel-Moore et al., 1989), little, if any, research has been conducted to explore whether adjustment to university contributes to eating problems. This lack of integration can be addressed if one follows a developmental systems perspective. A developmental systems perspective requires an integrated model of eating problems, wherein person-context interactions are the focus of inquiry. Depicted in Figure 4 is an integrative conceptual model that draws together the interesting lines of research on vulnerabilities, emotion regulation, and adjustment to university, from a developmental systems perspective, to show how these factors might work together to predict binge eating in emerging adults making the transition to university.

Two levels of analysis are included in the model: between-persons and within-persons. Specifically, following from the diversity assumption of developmental systems theory, between-person or individual differences in vulnerabilities will be associated with diversity in eating problems. In this model, the vulnerabilities of female gender, internalization of body ideals, and body dissatisfaction are presented as predicting binge eating behaviour. Furthermore, vulnerabilities are presented as interacting with emotion regulation and university adjustment variables to predict binge eating, an assumption

Figure 4. *Integrative model of associations between vulnerability, emotion regulation, university adjustment variables and binge eating and moderating effects of vulnerabilities.*



arising from a focus on person-context interaction. Gender, internalization of thin body ideals, and body dissatisfaction may moderate the associations between (a) stress, negative affect, and/or coping style and binge eating and (b) university adjustment and binge eating, so that these associations are stronger in vulnerable individuals.

In the emotion regulation section of the model, within-person associations between daily experiences of stress and binge eating and daily experiences of negative affect and binge eating are explored. A developmental systems framework assumes that within-individuals there is potential for different levels of functioning (i.e., plasticity) that can be seen in fluctuations in daily experiences. Person-context interaction is tested in this section of the model by the inclusion of between-person differences in coping style. Coping styles are presented as predicting binge eating, but also moderating the associations between daily stress and binge eating and daily negative affect and binge eating. In this way, the person level variables of coping style interact with daily experiences of the transition to university (i.e., context) to predict binge eating.

In the final component of the model between-person differences in university adjustment, perceived social and academic adjustment, are added as predictors of binge eating behaviour. The direct association between perceived adaptation to the university context and binge eating, and moderating effects of vulnerabilities (i.e., person-context interaction) are tested.

*The Current Study*

Before continuing to specific research questions derived from this integrative model, a discussion of the methodology used in the current study is needed. The current study employed daily interval data, also called daily diary or intensive repeated measures

data, to test the integrative model. Daily data allows for the exploration of day-to-day covariation among variables within individuals. It also allows for tests of between-person variables on these patterns of within-person covariation, that is, tests of person-context interaction. Daily diary data are often used to study the impact of daily events on physical and mental health outcomes (Eckenrode & Bolger, 1997). Intraindividual research can help clarify relations between relatively stable distal factors (e.g., between-person vulnerabilities) and more proximal factors that vary (e.g., within-person negative affect) and their interaction on behaviour (Nesselroade & Hershberger, 1993; Smyth et al., 2001). Different people experience and deal with life differently and these differences can be captured by daily diary data (Nesselroade & Hershberger, 1993). Understanding daily processes can advance theories based on results from traditional cross-sectional or experimental studies by exploring processes within individuals as they live their lives (Newth & DeLongis, 2004). In the current study, the university transition experience was captured by 14-day daily diary data. Daily experiences of stress, negative affect, and binge eating were observed as they unfolded over a two-week period during the first semester at university. Furthermore, between-person differences in vulnerabilities, coping style, and university adjustment were explored. Clearly, this methodology has the advantage of reducing recall bias and increasing ecological validity (Bolger, Davis, & Rafaeli, 2003; Smyth et al., 2001). It is also useful for understanding fluctuations in symptoms that may have potential clinical significance (Serpell & Tropp, 2003).

Specific research questions that follow from this methodology and that were derived from the integrative conceptual model are:

1. Do between-person differences in vulnerabilities (gender, internalization of body ideals, and body dissatisfaction) predict average levels of symptoms of binge eating across 14 days during the transition to university?
2. To what extent do daily variations in perceived stress and negative affect covary with daily variations in symptoms of binge eating?
3. Do between-person differences in coping style predict average levels of binge eating symptoms across 14 days?
4. Do between-person differences in coping style interact with variations in stress and negative affect to predict daily variations in symptoms of binge eating?
5. Do between-person differences in university adjustment predict average levels of binge eating symptoms across 14 days?
6. Does the integrated model fit the data better than the individual models?
7. Do between-person differences in vulnerabilities interact with emotion regulation variables and university adjustment variables to predict differences in symptoms of binge eating?

Based on findings from research reviewed in the previous sections, it is predicted that female gender, greater internalization of body ideals, and body dissatisfaction will be associated with greater symptoms of binge eating on average across a 14-day period during the transition to university. It is also predicted that daily variations in stress and negative affect will covary with increased symptoms of binge eating. On days participants report more stress and/or negative affect, more symptoms of binge eating will be reported. Between-person differences in emotion-oriented coping style and avoidance-oriented coping style will be associated with elevated average levels of binge

eating symptoms across the 14-day period and will moderate the associations between stress and negative affect and symptoms of binge eating. Students who perceive their social and/or academic adjustment to be poor will report more symptoms of binge eating on average across 14 days. The integrative model is expected to fit the data better than the individual models. Finally, vulnerabilities will interact with emotion regulation and university adjustment variables to predict binge eating symptoms. That is, associations among these variable are expected to be stronger for females, participants who have internalized body ideals, and who have greater body dissatisfaction.

# CHAPTER III

# METHOD

## *Participants*

Participants were 199 full-time first-year students at the University of Alberta who agreed to take part in the *Making the Transition* study. This is a web-based study of the health-related behaviors and long term academic performance of new university students. Sixty percent were female (54% of all full-time first-year students ages 19 years or younger in fall term 2004 at the University of Alberta were female). On average participants were 18.4 years of age (*SD* = .48; range = 17.3 to 19.9). Sixty-two percent self-identified as white, 21% Asian, 10% mixed ethnicity, 5% East Indian, 1% black, and 1% Arab. Fifty-five percent of participants lived with their parents, 30% in university residence, 10% in their own apartment (alone or with roommates), and 5% were in other living arrangements. None had ever been married; one participant reported cohabitating with another individual. Distribution across faculties was 46% Science, 35% Arts, 11% Engineering, 4% Agriculture, 3% Physical Education, and 1% other. This distribution matches closely with the actual faculty distribution of first-year students at the University of Alberta (36% Science, 29% Arts, 11% Engineering, 6% Agriculture, 4% Physical Education). Eighty-five percent of students indicated that they lived with both parents most of the time while growing up, and that 70% of their mothers and 74% of their fathers had completed college or university. Demographic questions appear in Appendix A.

*Procedure*

To participate, students were required to be 19 years of age or younger (i.e., under 20 years of age), enrolled full-time, and in their first year of any post-secondary education. These restrictions ensured that the sample consisted of students who were just beginning the transition to university. Students were also required to have access to the internet in the evenings, so that they could submit an online (web-based) questionnaire or checklist at the end of each day. All University of Alberta students receive computing accounts and email addresses, 100% have access to computer labs on campus, and 100% in dormitory rooms have high-speed access. A national survey of undergraduates, including University of Alberta students, indicated that 93% have access to a computer where they currently live (Canadian Undergraduate Survey Consortium, 2002).

The majority of participants were recruited from 12 introductory English classes (English 111; $n = 154$). Most first-year students at the University of Alberta take English 111 to fulfill the English requirement for their program of study. There were 95 sections of English 111 in fall term 2004, each with 35 to 40 students enrolled. Participants were also recruited from one introductory Engineering class because first-year Engineering students do not typically enroll in English 111 ($n = 18$). Some students were recruited through word-of-mouth, that is, they heard about the study and asked to participate ($n = 14$). Recruitment took place across fall term 2004. Data were collected between September 16 and December 1, 2004.

There were two parts to the study. First, students attended an initial group session. Research assistants explained the study in detail and participants signed consent forms (Appendix B) and completed a background questionnaire. Part two of the study asked

participants to complete an online (web-based) daily checklist for 14 consecutive days. The daily checklist portion of the study was run in four different 2-week periods, with a different group of students participating in each period. Email reminders to start the online daily checklist were sent on the start date. Each of the four groups started on a Thursday evening. Start dates were September 23, October 14, October 28, and November 18, 2004. Dates were selected to capture different periods of the transition to university, and to avoid conflicts with holidays, when students would be more likely to change their routine. Participants accessed the checklist, stored on the Department of Psychology's secure server, by entering the password for their group and their assigned individual study ID number. The checklist was available from 6:00 p.m. each evening until noon the next day. Participants were asked to complete the checklist as late as possible before going to sleep each night. The checklists were accessible until noon the next day, because pilot research indicated that students reporting in the morning tended to indicate that they were out drinking the previous evening. Across the 14 days, approximately 21% of participants completed the checklist between 6:00 p.m. and 9:00 p.m., 42% between 9:00 p.m. and midnight, 21% between midnight and 4:00 a.m., and 16% between 4:00 a.m. and noon the following day. On each of the 14 days the same daily checklist appeared. On eight of the 14 days, additional questions or measures appeared at the end of the checklist. These were "one-time-only measures" as they appeared on only one of the 14 days. The date and time each checklist was completed was recorded by the central server. A $5 honorarium was paid to each participant for each of the days a checklist was completed, to a maximum of $70 for all 14 days. In total, 194 participants submitted 2364 daily checklists. Of the five who did not complete any daily

checklists, three were male and two were female. Participants submitted 12 daily checklists on average (range = 2 to 14); 75% completed 12 or more days, 89% completed 10 or more days. Across the 14 days, the average percentage of participants who completed the daily checklist was 87% (range = 78% to 94%).

## *Measures*

### *Background Questionnaire*

*Body-ideal internalization.* Nine items from the Sociocultural Attitudes Towards Appearance Questionnaire (3 Revised Edition; Thompson et al., 2000) internalization subscale were used to measure internalization of body ideals prevalent in Western societies (Appendix C). Items included internalization of general body ideals presented on television and in magazines (e.g., "I try to look like the people on TV" and "I would like my body to look like the models who appear in magazines") as well as internalization of athletic body ideals (e.g., "I wish I looked as athletic as the people in magazines" and "I try to look like sports athletes"). All items are rated on a five-point Likert scale ranging from (1) *definitely disagree* to (5) *definitely agree*. Average scores across the nine items were calculated with higher scores indicating greater internalization of body ideals. Coefficient alpha for the nine items was .91.

*Body dissatisfaction.* Two subscales from the Body-Esteem (BE) Scale for Adolescents and Adults (Mendelson, Mendelson, & White, 2001) were combined to measure body dissatisfaction: the 12-item BE-Appearance subscale (general feelings about appearance) and the 6-item BE-Weight subscale (weight satisfaction; Appendix D). Participants indicated how often they agreed with a series of statements on a five-point Likert scale ranging from (0) *never* to (4) *always*. Examples of BE-Appearance items are

"I'm proud of my body" and "I worry about the way I look." Examples of BE-Weight items are "My weight makes me unhappy" and "I am satisfied with my weight." Subscales have high internal consistencies and test-retest reliability. Average scores across the 18 items were calculated, with higher scores indicating greater body dissatisfaction. Coefficient alpha for the 18 items was .94.

*Coping style.* The Coping Inventory for Stressful Situations (Endler & Parker, 1999) measured coping styles. In particular, the 16-item emotion-oriented coping subscale and the 16-item avoidance-oriented coping subscale were used. The emotion-oriented coping scale assesses the use of emotional responses such as self-blame, anger, self-preoccupation, and fantasizing to reduce stress. The avoidance-oriented coping subscale measures use of distraction and social diversion to avoid stressful situations. Participants indicated how much they engage these strategies when faced with situations that are stressful or upsetting. Responses were rated on a five-point Likert scale ranging from (1) *not at all* to (5) *very much*. Cronbach's alphas were .88 for the emotion-oriented subscale, and .80 for the avoidance-oriented subscale. Total scores were calculated with higher scores indicating greater tendency to use the specific coping style. Possible scores ranged from 16 to 80 for each subscale. Due to copyright considerations, this measure does not appear in an Appendix.

*Online One-Time-Only Measure*

*Perceived social and academic adjustment.* The Student Adaptation to College Questionnaire (SACQ; Baker & Siryk, 1989) measured social and academic adjustment. The 20-item Social Adjustment subscale and 24-item Academic Adjustment subscale were included. Items were adapted to be appropriate for Canadian participants (i.e.,

"college" was changed to "university").[1] Social adjustment items included questions about involvement in social activities, feelings of loneliness, and establishment of close social ties at university. Academic adjustment items included questions about ability to meet academic demands and enjoying academic challenges. All items were scored on a nine-point Likert scale ranging from (1) *applies to me very closely* to (9) *doesn't apply to me at all*. Total scores were calculated with higher scores indicating better adjustment to university in each domain. Coefficient alphas were .88 for academic adjustment and .92 for social adjustment. Possible scores ranged from 20 to 180 for the social adjustment subscale and from 24 to 216 for the academic adjustment subscale. The Personal-Emotional Adjustment subscale and Attachment subscale of the SACQ were not included in the *Making the Transition* study (and hence, were not included here). These two subscales were excluded because some items in these subscales already appear in the Social Adjustment subscale and other items overlapped with other measures included in *Making the Transition*. Due to copyright considerations, this measure does not appear in an Appendix.

*Daily Online Checklist*

*Binge eating symptoms.* Binge eating was measured using a subscale adapted from the Eating Disorders Inventory (Garner, Olmstead, & Polivy, 1983).[2] The adapted subscale (described in Klump, McGue, & Iacono, 2000; von Ranson, Iacono, & McGue, 2002) is composed of seven true-false items that were altered to reflect daily behavior for the current study. Participants were instructed to answer the items based on how they were feeling and what they were doing that day. Items assessed overeating, eating when upset, and feeling out of control while eating. The psychometric properties of similar

adaptations of this subscale have been found to be strong, and include good internal reliability, stability, and criterion validity (Klump, et al., 2000; von Ranson et al., 2002). Across the 14 days, internal reliability coefficients ranged from .51 though .84 with an average coefficient alpha of .73. Due to copyright considerations, this measure does not appear in an Appendix.

*Negative affect.* The negative affect subscale of The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) measured daily negative affect (Appendix E). The negative affect subscale consists of 10 items measuring negative emotions (e.g., guilty, afraid). Participants were asked to "indicate to what extent you have felt the following different emotions and feelings *today*." They responded on a five-point Likert scale ranging from (1) *very slightly or not at all* to (5) *extremely* for each of the items. Higher scores indicated greater negative affect. Coefficient alphas ranged from .83 through .91 across the 14 days, with a mean coefficient alpha of .88.

*Daily stress.* Participants completed the Daily Inventory of Stressful Events (Almeida, Wethington, & Kessler, 2002) to assess daily stress (Appendix F). Participants first indicated whether they had experienced seven specific stressful events. Examples include "Did you have an argument or disagreement with anyone?" and "Did anything happen at work or school (other than what you have already mentioned) that most people would consider stressful?" Participants who indicated that they had not experienced the particular situation received a score of zero for that item. Participants who indicated that, yes, they had experienced the situation rated the severity of stress experienced on a four-point Likert scale ranging from (1) *not at all stressful* to (4) *very stressful*. Following the scoring procedures outlined by Mroczek and Almeida (2004), a total daily stress score

was calculated for each day by summing the scores for all seven items. Possible scores range from 0 (experienced none of the potentially stressful situations) to 28 (experienced all seven situations at a level that was very stressful). Higher scores indicated that more events were experienced that were also considered stressful.

# CHAPTER IV

# RESULTS

*Subsample*

For all analyses, a sub-sample of 167 participants who completed at least one daily checklist and who also had complete background and one-time-only data were included. These restrictions are requirements of multilevel modeling (Raudenbush & Bryk, 2002). Five participants did not complete any daily checklists, one participant did not complete the internalization of body ideals measure included in the background questionnaire, and 26 participants did not complete the academic and/or social adjustment one-time-only measures, mainly because they did not complete the checklist on the day these one-time-only measures were presented. Sub-sample percentages for demographic variables described in Chapter III were within 2% of those reported for the full sample. For example, 62% of the sub-sample was female (compared to 60% in the full sample), 61% identified as white (compared to 62%), 34% were registered in the Faculty of Arts (compared to 35%), and 87% indicated that they lived with both parents most of the time while growing up (compared to 85%). Mean age of the sub-sample was the same as the full sample.

*Descriptive Statistics*

Table 1 presents means and standard deviations for between-person predictors measured in the background questionnaire or as one-time-only measures online. Average scores for body dissatisfaction and internalization of body ideals were below the mid-points for each measure, indicating that participants were more satisfied than dissatisfied with their bodies and that they tended to disagree that body ideals were important. For the

Table 1

*Means, Standard Deviations, and Indices of Skewness and Kurtosis for Vulnerability, Coping Style, and University Adjustment Variables*

| | Total | | | Females | | | Males | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | *M (SD)* | *Skew* | *Kurtosis* | *M (SD)* | *Skew* | *Kurtosis* | *M (SD)* | *Skew* | *Kurtosis* |
| *Vulnerabilities* | | | | | | | | | |
| Body Dissatisfaction[a] | 1.56 (.75) | .43 | -.19 | 1.70 (.81)$_f$ | .30 | -.54 | 1.34 (.60)$_g$ | .16 | -.13 |
| Internalization of Body Ideals[b] | 2.69 (.91) | .11 | -.43 | 2.67 (.84) | .03 | -.52 | 2.71 (1.02) | .16 | -.51 |
| *Coping Style* | | | | | | | | | |
| Avoidance-Oriented Coping[c] | 44.77 (10.18) | -.09 | .08 | 46.14 (10.32)$_f$ | -.12 | .14 | 42.49 (9.61)$_g$ | -.16 | .04 |
| Emotion-Oriented Coping[c] | 40.84 (10.39) | .18 | -.27 | 41.80 (10.65) | .03 | -.60 | 39.25 (9.82) | .45 | .82 |
| *University Adjustment* | | | | | | | | | |
| Social Adjustment[d] | 118.92 (25.62) | -.32 | -.30 | 119.42 (26.51) | -.38 | -.15 | 118.10 (24.26) | -.21 | -.62 |
| Academic Adjustment[e] | 127.79 (26.19) | .23 | .15 | 126.78 (26.65) | .30 | .33 | 129.44 (25.54) | .13 | -.04 |

*Note.* $N = 167$. $n = 104$ females. $n = 63$ males. [a]possible range: 0 to 4. [b]possible range: 1 to 5. [c]possible range: 16 to 80. [d]possible range: 20 to 180. [e]possible range: 24 to 216. Means in the same row with the different subscripts differ at $p < .05$.

coping style measures, the avoidance-oriented coping subscale total scores and standard deviations were similar to the norms published for undergraduate females and males. The emotion-oriented coping subscale total scores were slightly lower than were the norms for undergraduates and more similar to norms for adults, indicating that they used emotion-oriented coping less than other undergraduate samples (Endler & Parker, 1999). Social adjustment total scores were similar to published total scores for students in their first semester of university. The academic adjustment total scores were lower than the published totals, which are usually in the 140 to 150 point range (Baker & Siryk, 1989).

Gender differences in average scores were tested using MANOVA. Overall, there was a significant multivariate effect for gender, $F(6, 160) = 3.30$, $p < .05$, partial $\eta^2 = .11$. Univariate results showed that females scored higher on avoidance-oriented coping, $F(1, 165) = 5.17$, $p < .05$, partial $\eta^2 = .03$, and that females had higher body dissatisfaction scores than males, $F(1, 165) = 9.26$, $p < .05$, partial $\eta^2 = .05$. No other gender differences were significant.

Table 2 presents correlations among the between-person predictors separately by gender. For males and females, greater internalization of body ideals was associated with greater emotion-oriented coping, greater emotion-oriented coping was associated with poorer social and academic adjustment, and social and academic adjustment were positively correlated. For males, body dissatisfaction was associated with all other variables and greater internalization of body ideals was associated with poorer academic adjustment. For females, greater body dissatisfaction was associated with all variables except avoidance-oriented coping; avoidance-oriented coping correlated positively with social adjustment.

Table 2

*Intercorrelations Among Vulnerability, Coping Style, and University Adjustment Variables*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Body Dissatisfaction | -- | .34* | .35* | -.25* | -.36* | -.47* |
| 2. Internalization of Body Ideals | .45* | -- | .28* | .12 | -.17 | -.34* |
| 3. Emotion-Oriented Coping | .39* | .20* | -- | .06 | -.32* | -.33* |
| 4. Avoidance-Oriented Coping | .06 | .17 | .06 | -- | .22 | .21 |
| 5. Social Adjustment | -.31* | .03 | -.28* | .30* | -- | .65* |
| 6. Academic Adjustment | -.36* | -.02 | -.38* | .05 | .41* | -- |

*Note.* $n = 63$ males above the diagonal. $n = 104$ females below the diagonal.

* $p < .05$.

Means and standard deviations of daily checklist measures are presented in Tables 3 through 6, by day and gender. As well, 14-day average scores were calculated. Most participants reported zero or one symptom of binge eating (a score of .14 corresponds to one symptom). Binge eating symptoms scores were low because on the majority of days, the majority of participants did not report any symptoms of binge eating. Table 4 presents the percentage of participants reporting any symptoms of binge eating, by day and gender. On average, 19% of participants reported at least one symptom of binge eating across 14 days (10% of participants reported two or more symptoms which corresponds to a score of .29 or higher). Average stress scores (see Table 5) indicated that across the 14 days participants experienced low to moderate levels of stress. For example, a score of three could be achieved if a participant experienced three events he or she considered not at all stressful or one event considered somewhat stressful. Negative affect scores (see Table 6) were also low across the 14 days.

Gender differences in 14-day average scores were tested using MANOVA. Overall, there was a significant multivariate effect for gender, $F(3, 158) = 4.30$, $p < .05$, partial $\eta^2 = .08$. Univariate results showed that females reported more symptoms of binge eating, $F(1, 160) = 11.00$, $p < .05$, partial $\eta^2 = .06$, and more stress than males, $F(1, 160) = 5.92$, $p < .05$, partial $\eta^2 = .04$. There was no significant gender difference for 14-day negative affect scores.

Table 7 presents correlations among the 14-day average scores for binge eating symptoms, stress, and negative affect separately by gender. For both males and females stress and negative affect were significantly correlated. Greater stress was associated with

Table 3

*Means and Standard Deviations for Daily Binge Eating Symptoms*

| | Total | | Females | | Males | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Day 1 | .09 | .14 | .12 | .15 | .05 | .10 |
| Day 2 | .06 | .14 | .09 | .17 | .03 | .08 |
| Day 3 | .04 | .13 | .04 | .11 | .04 | .15 |
| Day 4 | .05 | .13 | .07 | .14 | .03 | .10 |
| Day 5 | .06 | .16 | .09 | .19 | .01 | .06 |
| Day 6 | .06 | .14 | .07 | .16 | .03 | .10 |
| Day 7 | .05 | .13 | .07 | .15 | .01 | .06 |
| Day 8 | .04 | .12 | .05 | .14 | .01 | .06 |
| Day 9 | .04 | .12 | .06 | .14 | .01 | .06 |
| Day 10 | .05 | .14 | .07 | .16 | .02 | .07 |
| Day 11 | .04 | .14 | .07 | .17 | .01 | .04 |
| Day 12 | .06 | .17 | .10 | .21 | .01 | .06 |
| Day 13 | .05 | .16 | .07 | .16 | .01 | .05 |
| Day 14 | .06 | .17 | .08 | .21 | .02 | .07 |
| 14-Day Average | .06 | .10 | $.08_a$ | .12 | $.02_a$ | .05 |

*Note.* $N = 167$ total with a range of 130-166 across days. $n = 104$ females with a range of 79-103 across days. $n = 63$ males with a range of 48-63 across days. Possible range on binge eating symptoms: 0 to 1. Fourteen-day average means with the same subscript differ at $p < .05$.

Table 4

*Percentages of Participants Reporting Any Symptoms of Binge Eating*

| | Total | Females | Males |
|---|---|---|---|
| Day 1 | 40% | 47% | 28% |
| Day 2 | 22% | 27% | 16% |
| Day 3 | 17% | 20% | 13% |
| Day 4 | 21% | 28% | 10% |
| Day 5 | 19% | 28% | 4% |
| Day 6 | 18% | 24% | 7% |
| Day 7 | 18% | 26% | 5% |
| Day 8 | 13% | 18% | 5% |
| Day 9 | 15% | 22% | 4% |
| Day 10 | 18% | 23% | 8% |
| Day 11 | 15% | 21% | 5% |
| Day 12 | 20% | 28% | 6% |
| Day 13 | 19% | 25% | 8% |
| Day 14 | 15% | 20% | 7% |
| 14-Day Average | 19% | 26% | 9% |

*Note.* $N = 167$ total with a range of 130-166 across days. $n = 104$ females with a range of 79-103 across days. $n = 63$ males with a range of 48-63 across days.

Table 5

*Means and Standard Deviations for Daily Stress Severity*

| | Total | | Females | | Males | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Day 1 | 5.77 | 4.77 | 5.90 | 4.85 | 5.56 | 4.69 |
| Day 2 | 3.70 | 3.49 | 3.87 | 3.27 | 3.47 | 3.79 |
| Day 3 | 2.92 | 3.54 | 2.94 | 2.73 | 2.88 | 3.26 |
| Day 4 | 3.07 | 3.80 | 3.03 | 3.80 | 3.14 | 3.84 |
| Day 5 | 3.21 | 3.86 | 3.61 | 4.29 | 2.56 | 2.95 |
| Day 6 | 2.88 | 3.52 | 3.30 | 3.95 | 2.16 | 2.49 |
| Day 7 | 2.63 | 3.31 | 2.88 | 3.52 | 2.17 | 2.88 |
| Day 8 | 2.11 | 3.09 | 2.46 | 3.07 | 1.53 | 3.07 |
| Day 9 | 2.03 | 3.11 | 2.40 | 3.37 | 1.48 | 2.60 |
| Day 10 | 1.77 | 2.92 | 2.33 | 3.34 | .79 | 1.57 |
| Day 11 | 2.02 | 3.28 | 2.41 | 3.74 | 1.35 | 2.15 |
| Day 12 | 2.29 | 3.77 | 2.59 | 4.07 | 1.79 | 3.17 |
| Day 13 | 1.99 | 3.49 | 2.20 | 3.62 | 1.63 | 3.23 |
| Day 14 | 2.66 | 3.82 | 3.23 | 4.39 | 1.68 | 2.29 |
| 14-Day Average | 2.73 | 2.17 | $3.04_a$ | 2.43 | $2.23_a$ | 1.57 |

*Note.* $N = 167$ total with a range of 125-162 across days. $n = 104$ females with a range of 75-101 across days. $n = 63$ males with a range of 48-62 across days. Possible range on stress severity: 0 to 28. 14-Day average means with the same subscript differ at $p < .05$.

Table 6

*Means and Standard Deviations for Daily Negative Affect*

| | Total | | Females | | Males | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Day 1 | 1.96 | .69 | 2.05 | .75 | 1.82 | .60 |
| Day 2 | 1.85 | .72 | 1.94 | .79 | 1.71 | .58 |
| Day 3 | 1.67 | .59 | 1.66 | .59 | 1.69 | .60 |
| Day 4 | 1.69 | .66 | 1.72 | .73 | 1.63 | .55 |
| Day 5 | 1.84 | .78 | 1.98 | .86 | 1.60 | .57 |
| Day 6 | 1.83 | .77 | 1.90 | .82 | 1.72 | .68 |
| Day 7 | 1.76 | .71 | 1.81 | .76 | 1.66 | .60 |
| Day 8 | 1.77 | .69 | 1.84 | .72 | 1.66 | .62 |
| Day 9 | 1.74 | .70 | 1.77 | .69 | 1.71 | .70 |
| Day 10 | 1.67 | .61 | 1.71 | .63 | 1.61 | .56 |
| Day 11 | 1.72 | .64 | 1.76 | .67 | 1.67 | .60 |
| Day 12 | 1.81 | .75 | 1.82 | .78 | 1.79 | .71 |
| Day 13 | 1.81 | .75 | 1.83 | .76 | 1.78 | .74 |
| Day 14 | 1.82 | .80 | 1.86 | .88 | 1.77 | .65 |
| 14-Day Average | 1.78 | .50 | 1.83 | .51 | 1.70 | .46 |

*Note.* $N = 167$ total with a range of 134-167 across days. $n = 104$ females with a range of 81-103 across days. $n = 63$ males with a range of 49-63 across days. Possible range of negative affect: 1 to 5.

Table 7

*Intercorrelations Among 14-Day Average Binge Eating Symptoms, Stress, and Negative Affect Scores*

| Measure | 1 | 2 | 3 |
|---|---|---|---|
| 1. Binge Eating Symptoms | -- | .17 | .21 |
| 2. Stress | .35* | -- | .46* |
| 3. Negative Affect | .30* | .55* | -- |

*Note.* $n$ = 61-62 males above the diagonal. $n$ = 101-102 females below the diagonal.

* $p < .05$.

increased negative affect. In addition, for females only, stress and negative affect were correlated positively with binge eating symptoms. Females who reported more stress and negative affect on average, also reported more symptoms of binge eating on average across 14 days.

*Multilevel Modeling*

Preliminary data checking revealed that the outcome variable, binge eating symptoms, was highly skewed and could not be transformed to meet the normality assumption of multilevel modeling. Across the 14 days, indices of skewness ranged from 1.71 to 4.45 and indices of kurtosis ranged from 2.76 to 24.22. Therefore, the binge eating symptoms variable was dichotomized (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). For each of the 14 days, individuals who reported no symptoms of binge eating received a score of zero and participants who reported any (one to seven) symptoms of binge eating received a score of one (see Table 4 for the percentage of participants reporting any symptoms of binge eating by day and gender). This allowed for tests of the likelihood of reporting any symptoms of binge eating.

Hierarchical Generalized Linear Modeling (HGLM; Raudenbush & Bryk, 2002) was used to analyze the data. HGLM is the multilevel modeling equivalent of logistic regression. As with multilevel modeling of continuous outcome variables, HGLM calculates a separate within-person model of regression intercepts and slopes for each person. Then a between-person model can be estimated in which the within-person slopes and intercepts are treated as dependent variables regressed on person-level predictor variables.

For illustrative purposes, the simple form of an HGLM of repeated-measures data can be conceived of as two separate models, one a within-person model (Level 1) and the other a between-person model (Level 2). Equation 1 expresses the predicted log-odds of reporting one or more symptoms of binge eating for person *j* across *i* occasions.

$$\text{Level 1: Binge Eating Symptoms}_{ij} = \beta_{0j} \qquad (1)$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + u_{0j} \qquad (2)$$

Equation 2 models the log-odds of reporting one or more symptoms of binge eating for person *j* across *i* occasions as a function of the average log-odds of reporting one or more symptoms of binge eating across persons, $\gamma_{00}$, and random deviation from this average, $u_{0j}$. Predictors of the log-odds of reporting one or more symptoms of binge eating can be added at both Level 1 (within-person predictors) and Level 2 (between-person predictors). For example, in Equation 3, daily stress is added at Level 1, testing the within-person association between experiences of stress and the log-odds of reporting one or more symptoms of binge eating. In Equation 4, gender, $\gamma_{01}$, is entered as a between-person predictor of the average log-odds of binge eating symptoms, $\beta_{0j}$. Equation 5 tests the cross-level interaction (Level 1 X Level 2) between gender, $\gamma_{11}$, and the effect of stress, $\beta_{1j}$, on the log-odds of binge eating symptoms. That is, the moderating effect of gender on the association between within-person stress and the log-odds of reporting one more symptoms of binge eating is tested.

$$\text{Binge Eating Symptoms}_{ij} = \beta_{0j} + \beta_{1j}(\text{stress}) \qquad (3)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{gender}) + u_{0j} \qquad (4)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{gender}) + u_{1j} \qquad (5)$$

All HGLM results are based on the Laplace method of parameter estimation. This method produces highly accurate parameter estimates and computes reliable deviance statistics allowing for tests of model fit among nested models (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). It should be noted that a strength of HGLM is that all 167 individuals are included in the analysis. Data from participants who completed the binge eating symptoms measure on all 14 days are weighted more heavily, but as long as one occasion of measurement is available, the case is used in the estimation of effects.

Preliminary analysis of a model with no Level 1 or Level 2 predictors, the unconditional model (see Equations 1 and 2), showed that average log-odds of reporting one or more symptoms of binge eating across the 14 days was -2.43 ($SE$ = .19, $t(166)$ = -12.60, $p < .05$). The log-odds is transformed to an odds ratio via the exponentiation of the log-odds, $e^{\text{log-odds}}$ (Cohen, Cohen, West, & Aiken, 2003; Raudenbush & Bryk, 2002). For the unconditional model the log-odds corresponds to an odds ratio of .09 (95% $CI$ = .06, .13). That is, for participants with an average rate of binge eating symptoms, about one in eleven would be expected to have reported symptoms across the 14 days. The reliability of this estimate was high (.80). For all analyses, continuous predictors at Level 1 and Level 2 were grand mean centered.

*Vulnerability model.* Results for the vulnerability model (see Figure 1 in Chapter II) are presented in Table 8. The three vulnerability variables, gender, internalization of body ideals, and body dissatisfaction were entered in Model 1 as between-person predictors of the average likelihood of reporting one or more symptoms of binge eating (portrayed in Figure 1 as solid one-way arrows). All three predictors were significant. The significant effect for gender (odds ratio of .21) indicates that males were 79% less

Table 8

*HGLM Results Testing Vulnerability Model Effects on the Likelihood of Reporting Symptoms of Binge Eating*

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | OR | CI | OR | CI |
| Gender | .21* | (.10, .48) | .19* | (.08, .45) |
| Internalization of Body Ideals | 1.56* | (1.02, 2.39) | 1.32 | (.75, 2.31) |
| Body Dissatisfaction | 2.19* | (1.21, 3.97) | 2.66* | (1.37, 5.16) |
| Gender X Internalization | | | 1.51 | (.62, 3.69) |
| Gender X Body Dissatisfaction | | | .43 | (.09, 2.07) |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

likely to report one or more symptoms of binge eating compared to females, controlling for internalization of body ideals and body dissatisfaction. The significant effect of internalization of body ideals indicated that the likelihood of reporting symptoms of binge eating increased by a factor of 1.56 for each unit increase in internalization of body ideals, controlling for gender and body dissatisfaction. It can be said that participants who rated body ideals as somewhat important (score of 4) were 56% more likely to report one or more symptoms of binge eating compared to participants who neither agreed or disagreed that body ideals were important (score of 3). The significant effect of body dissatisfaction revealed that for each unit increase in body dissatisfaction, participants were 2.19 times more likely to report one or more symptoms of binge eating, controlling for gender and internalization. For example, participants who sometimes felt dissatisfied with their bodies (score of 2) were twice as likely to report one or more symptoms of binge eating as participants who were seldom dissatisfied with their body (score of 1).

Model 2 tested the interactions between gender and internalization and gender and body dissatisfaction on likelihood of reporting one or more symptoms of binge eating (portrayed by the dashed arrows in Figure 1). Neither was significant. That is, gender did not moderate the effects of internalization of body ideals or body dissatisfaction on the likelihood of reporting symptoms of binge eating. With the inclusion of the interaction terms in the model, the effect of internalization was no longer significant.

*Emotion regulation model.* Table 9 presents the results for the emotion regulation model (see Figure 2 in Chapter II). In Model 1, the within-person effects of stress and negative affect on the likelihood of reporting one or more symptoms of binge eating were entered at Level 1. In a preliminary model (not shown) the effects of stress and negative

Table 9

*HGLM Results Testing Emotion Regulation Model Effects on the Likelihood of Reporting Symptoms of Binge Eating*

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| Variable | OR | CI | OR | CI | OR | CI |
| Within-Person Effect of Stress | 1.10* | (1.05, 1.16) | 1.09* | (1.03, 1.16) | 1.12* | (1.07, 1.18) |
| Gender | 1.08 | (.98, 1.19) | 1.08 | (.97, 1.21) | | |
| Emotion-Oriented Coping | | | 1.00 | (.99, 1.01) | | |
| Avoidance-Oriented Coping | | | 1.00 | (.99, 1.01) | | |
| Within-Person Effect of NA | 1.98* | (1.49, 2.63) | 1.99* | (1.45, 2.67) | 1.90* | (1.47, 2.46) |
| Gender | 1.10 | (.59, 2.06) | 1.08 | (.57, 2.07) | | |
| Emotion-Oriented Coping | | | .99 | (.97, 1.02) | | |
| Avoidance-Oriented Coping | | | .99 | (.96, 1.02) | | |
| Between-Person Effects | | | | | | |
| Gender | .18* | (.08, .40) | .21* | (.09, .48) | .23* | (.10, .52) |
| Emotion-Oriented Coping | | | 1.04* | (1.01, 1.08) | 1.06* | (1.01, 1.10) |
| Avoidance-Oriented Coping | | | 1.01 | (.97, 1.05) | 1.00 | (.95, 1.05) |
| Gender X Emotion | | | | | .95 | (.87, 1.04) |
| Gender X Avoidance | | | | | 1.04 | (.94, 1.15) |

*Note.* NA = negative affect. OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

affect were allowed to vary across participants. That is, a random effect, $u_{1j,}$ was included in the Level 2 models of the stress and negative affect slopes (see Equation 5). However, the reliabilities of these estimates were very low (reliability of stress estimate = .01; reliability of negative affect estimate = .01) indicating that there was little random variation in the stress and negative affect slopes. Therefore, in all subsequent models, the effects of stress and negative affect were fixed across participants. That is, the slopes were made non-randomly varying (Raudenbush & Bryk, 2002). This restriction does not rule out testing Level 1 X Level 2 interactions (i.e., between-person predictors of the effects of stress or negative affect on binge eating symptoms). The slopes can vary by between-person predictors (Raudenbush & Bryk, 2002; Singer & Willet, 2004). For example, the Level 1 X Level 2 interactions between gender and stress, and gender and negative affect in Model 1 test whether the effects of stress and negative affect on the likelihood of reporting one or more symptoms of binge eating vary as a function of gender.

Model 1 results showed that the associations of stress and negative affect with the likelihood of reporting one or more symptoms of binge eating were significant within-participants across 14 days. The significant effect of stress showed that for each unit increase in stress, the average participant was 1.10 times more likely to report one or more symptoms of binge eating, controlling for negative affect. For example, a participant who experienced one event rated not very stressful (resulting in a total stress score of one) would be 10% more likely to report one or more symptoms of binge eating that day compared to days when their stress score was zero. The significant effect of negative affect showed that for each unit increase in negative affect, participants were

about twice as likely (odds ratio = 1.98) to report one or more symptoms of binge eating, controlling for stress. That is, the likelihood of binge eating increased by a factor of about two on days a participant reported moderate amounts of negative affect (score of 3) versus days the same participant reported only a little negative affect (score of 2). The cross-level interactions between gender and stress and gender and negative affect were not significant (portrayed in Chapter II, Figure 2 by two dashed arrows leading from gender to the solid arrows connecting daily stress and daily negative affect to daily symptoms binge eating). Gender did not moderate the effects of stress and negative affect on the likelihood of reporting one or more symptoms of binge eating. As in the vulnerability model, the main effect of gender at Level 2 was significant. Males were less likely to report one or more symptoms of binge eating than females.

In Model 2, the two coping style variables were added at Level 2 as between-person predictors of the average likelihood of reporting one or more symptoms of binge eating (portrayed in Chapter II, Figure 2, by one-way arrows leading from coping style to daily symptoms of binge eating). Coping styles were also included as moderators of the stress and negative affect effects on the likelihood of reporting one or more symptoms of binge eating (i.e., Level 1 X Level 2 interactions depicted in Chapter II, Figure 2, by dashed arrows leading from coping styles to the solid arrows connecting daily stress and daily negative affect to daily symptoms of binge eating). Only emotion-oriented coping style predicted an increase in the average likelihood of reporting one or more symptoms of binge eating. For each unit increase in emotion-oriented coping participants were 1.04 times as likely to report binge eating symptoms, controlling for gender and avoidance-oriented coping. Neither emotion-oriented coping nor avoidance-oriented coping

interacted with stress or negative affect to predict the likelihood of symptoms of binge eating. That is, coping style did not moderate the effects of stress and negative affect on the likelihood of binge eating symptoms.

In Model 3 of Table 9, tests of gender X coping style interactions on the average likelihood of reporting one or more symptoms of binge eating were performed (illustrated in, Figure 2, by dashed arrows leading from gender to the solid arrows linking coping style and daily symptoms of binge eating). These tests were conducted to examine whether associations between coping style and the likelihood of reporting one or more symptoms of binge eating differed for females compared to males. Neither interaction term was significant.

*University adjustment model.* Results for the university adjustment model (see Figure 3 in Chapter II) are presented in Table 10. Model 1 tested the between-person effects of social and academic adjustment on the likelihood of reporting one or more symptoms of binge eating, controlling for gender. The significant effect of academic adjustment showed that for each unit increase in academic adjustment participants were slightly less likely to report one or more symptoms of binge eating. The effect of social adjustment was not significant. In Model 2, however, interactions between gender and each of the adjustment variables (depicted in Chapter II, Figure 3, by dashed arrows leading from gender to the solid lines connecting university adjustment to symptoms of binge eating) were tested and a significant interaction between gender and social adjustment was found. To explore this interaction further, Model 1 was re-run separately for females and males. For females, the likelihood of reporting one or more symptoms of binge eating decreased slightly for every unit increase in social adjustment (*odds ratio* =

Table 10

*HGLM Results Testing University Adjustment Model Effects on the Likelihood of Reporting Symptoms of Binge Eating*

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | OR | CI | OR | CI |
| Gender | .17* | (.08, .36) | .16* | (.07, .37) |
| Social Adjustment | .99 | (.98, 1.01) | .98* | (.96, .99) |
| Academic Adjustment | .99* | (.97, .99) | .98* | (.97, 1.00) |
| Gender X Social Adjustment | | | 1.67* | (1.01, 1.12) |
| Gender X Academic Adjustment | | | .97 | (.93, 1.01) |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

.98, 95% *CI* = .96, .99). The effect of social adjustment was not significant for males (*odds ratio* = 1.04, 95% *CI* = 1.00, 1.08). The gender by social adjustment interaction is shown in Figure 5.

*Integrative model.* The integrative model includes only significant effects from earlier tests of the separate models. This model building strategy is recommended for developing parsimonious models (Snijders & Bosker, 1999). Four sets of analyses tested the integrative model illustrated in Chapter II, Figure 4. In the first set of analyses, models were nested and deviance statistics compared to test for improvements in model fit (Kreft & De Leeuw, 1998). This provides a test of the strength of association between the set of variables and the outcome (Tabachnick & Fidell, 1996). Table 11 presents deviance statistic tests. First, the deviance statistic for the unconditional model, a model without any predictors, was calculated as the baseline or comparison model. Next, the vulnerability model variables were added and the deviance statistic was compared to that of the unconditional model. The vulnerability model variables were added first because they were conceptualized as developing prior to the transition to university. That is, they were considered temporally distal risk factors. The decrease in the deviance statistic was significant, indicating that the vulnerability variables were reliably associated with the likelihood of binge eating symptoms. Then significant effects from the emotion regulation model were added to this model. Emotion regulation model variables were added next because they were conceptualized as capturing proximal experiences of the participants. Specifically, the within-person effects of stress and negative affect and the between-person effect of emotion-oriented coping were included. The decrease in the deviance statistic was significant, indicating that the inclusion of the emotion regulation

*Figure 5.* The gender by social adjustment interaction effect on the likelihood of reporting symptoms of binge eating.

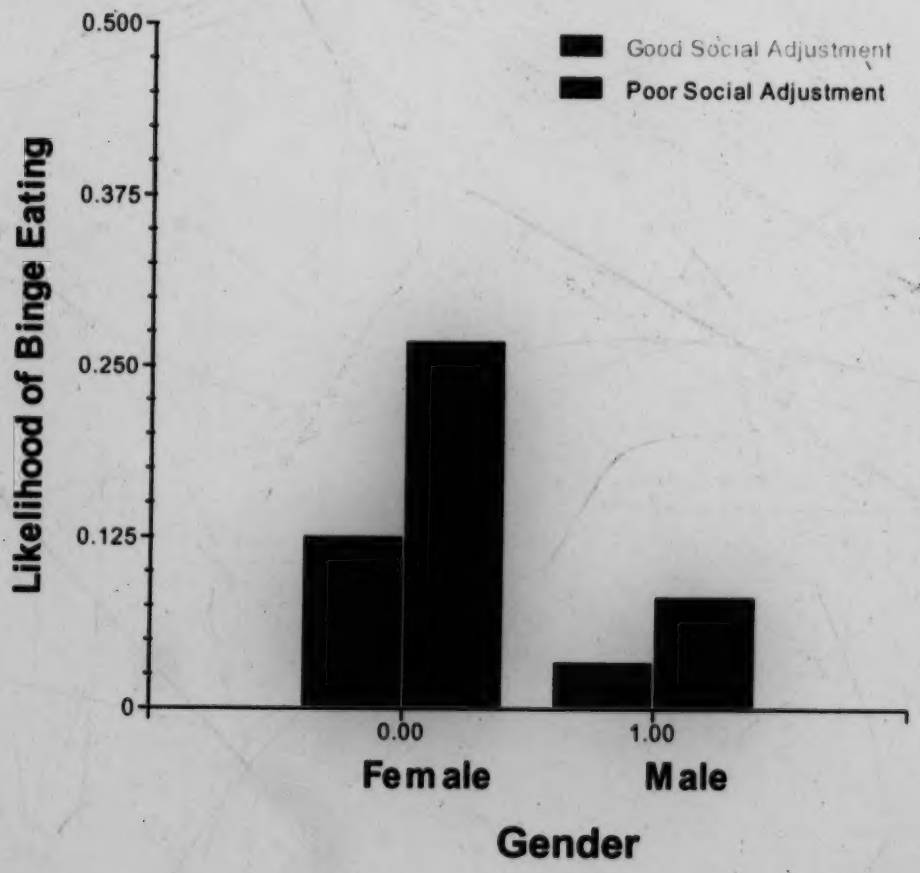


Table 11

*Chi-square Tests of Change in Deviance Statistics for Nested Models*

| Model | Deviance | $\chi^2$ | *df* |
|---|---|---|---|
| Unconditional[a] | 5292.34 | | |
| Vulnerability | 5254.05 | 38.28* | 3 |
| Gender | | | |
| Body Dissatisfaction | | | |
| Internalization of Body Ideals | | | |
| Emotion Regulation | 4922.65 | 331.41* | 3 |
| Within-Person Stress | | | |
| Within-Person Negative Affect | | | |
| Emotion-Oriented Coping | | | |
| University Adjustment | 4913.58 | 9.07* | 3 |
| Social Adjustment | | | |
| Academic Adjustment | | | |
| Gender X Social Adjustment | | | |

*Note.* [a] the unconditional model is illustrated in Equation 2. This is the initial model, with no predictors of the likelihood of binge eating symptoms, against which the vulnerability model was compared.

* $p < .05$.

variables contributed to the prediction of binge eating symptoms after accounting for the effects of vulnerabilities. Next, significant university adjustment variables were added—social adjustment, academic adjustment, and the social adjustment X gender interaction term.

University adjustment variables were added last to determine whether adjustment to university (a marker of a recent process in the participants' lives) contributed to the prediction of symptoms of binge eating after accounting for the effects of established risk factors included in the other models. Although smaller than in the previous step, the decrease in the deviance statistic was significant, indicating that the inclusion of the university adjustment variables contributed to the prediction of binge eating symptoms after accounting for the effects of vulnerability and emotion regulation variables. Thus, the integrated model provided a better fit to the data than the individual models.

Tests of the individual variables included in the inclusive model are presented in Table 12. Gender, internalization of body ideals and the gender X social adjustment interaction term were significant between-person predictors of the likelihood of reporting one or more symptoms of binge eating in the combined model. The main effects of body dissatisfaction and academic adjustment were not significant in the final combined model, however. Although the odds ratio for body dissatisfaction was not significant using a 95% confidence interval, the log-odds (*coefficient* = .51, *SE* = .32, $p = .11$) suggested a trend. The academic adjustment effect just missed significance, (*coefficient* = -.01, *SE* = .01, $p = .07$). Stress and negative affect remained significant within-person predictors of the likelihood of reporting one or more symptoms of binge eating in the combined model.

Table 12

*HGLM Results Testing the Effects of the Final Integrative Model on the Likelihood of Reporting Symptoms of Binge Eating*

| Variable | OR | CI |
|---|---|---|
| Vulnerabilities | | |
| Gender | .25* | (.11, .55) |
| Internalization of Body Ideals | 1.70* | (1.08, 2.67) |
| Body Dissatisfaction | 1.66 | (.89, 3.10) |
| Emotion Regulation | | |
| Within-person Stress | 1.12* | (1.07, 1.18) |
| Within-person Negative Affect | 1.87* | (1.46, 2.41) |
| Emotion-Oriented Coping | 1.00 | (.96, 1.04) |
| University Adjustment | | |
| Social Adjustment | .99 | (.97, 1.00) |
| Academic Adjustment | .99 | (.97, 1.00) |
| Gender X Social Adjustment | 1.04* | (1.01, 1.07) |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

In the second and third tests of the integrative model, the moderating effects of body dissatisfaction and internalization of body ideals on the significant emotion regulation-binge eating associations were tested. Gender interactions were not included in these models because they were tested previously and not found to be significant. The dashed arrow leading from vulnerabilities to the solid arrow connecting emotion regulation and binge eating symptoms portrays these interactions in Chapter II, Figure 4. Table 13 presents the tests of the moderating effects of body dissatisfaction on the associations among emotion regulation variables and the likelihood of reporting one or more symptoms of binge eating. In Model 1, cross-level interactions (Level 1 X Level 2) were tested. Neither was significant. That is, body dissatisfaction did not moderate the effects of stress or negative affect on the likelihood of reporting one or more symptoms of binge eating. In Model 2, the body dissatisfaction by emotion-oriented coping interaction was tested to examine whether the association between emotion-oriented coping and the likelihood of reporting one or more symptoms of binge eating differed based on level of body dissatisfaction. It was not significant.

Next, the moderating effects of internalization of body ideals on the significant associations among emotion regulation variables and the average likelihood of reporting one or more symptoms of binge eating were tested. Table 14 presents these results. In Model 1 cross-level interactions (Level 1 X Level 2) were tested. There was a significant interaction between internalization of body ideals and negative affect. The interaction is presented in Figure 6. Greater internalization of body ideals amplified the association between negative affect and the likelihood of reporting one or more symptoms of binge eating when negative affect was low, but not when it was high. The interaction between

Table 13

*HGLM Results Testing the Effects of Body Dissatisfaction by Emotion Regulation Variable Interactions on the Likelihood of Reporting Symptoms of Binge Eating*

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | OR | CI | OR | CI |
| Within-Person Effect of Stress | 1.13* | (1.08, 1.17) | 1.13* | (1.08, 1.18) |
| Body Dissatisfaction | .97 | (.92, 1.02) | | |
| Within-Person Effect of Negative Affect | 2.04* | (1.55, 2.69) | 1.96* | (1.52, 2.54) |
| Body Dissatisfaction | .92 | (.70, 1.20) | | |
| Between-Person Effects | | | | |
| Body Dissatisfaction | 3.52* | (2.04, 6.07) | 3.04* | (1.66, 5.54) |
| Emotion-Oriented Coping | | | 1.02 | (.98, 1.06) |
| Avoidance-Oriented Coping | | | 1.01 | (.98, 1.06) |
| Body Dissatisfaction X Emotion | | | .99 | (.94, 1.04) |
| Body Dissatisfaction X Avoidance | | | 1.03 | (.97, 1.08) |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

Table 14

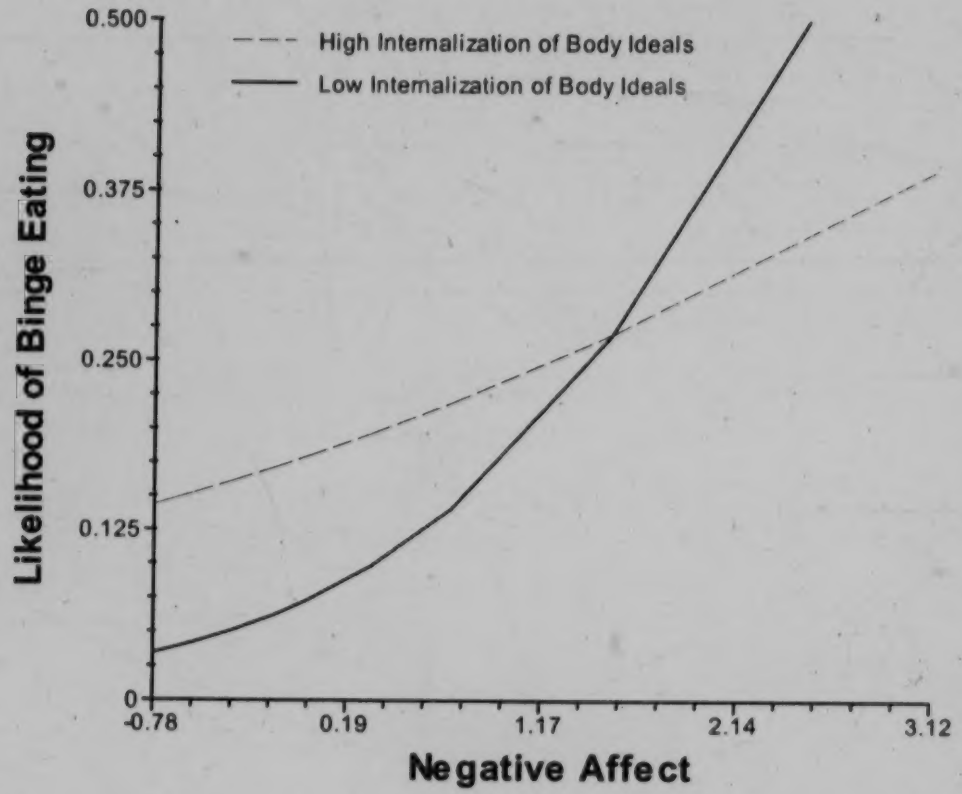
*HGLM Results Testing the Effects of Internalization of Body Ideals by Emotion Regulation Variable Interactions on the Likelihood of Reporting Symptoms of Binge Eating*

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | OR | CI | OR | CI |
| Within-Person Effect of Stress | 1.12* | (1.06, 1.19) | 1.13* | (1.07, 1.18) |
| Internalization of Body Ideals | 1.02 | (.97, 1.08) | | |
| Within-Person Effect of Negative Affect | 2.18* | (1.66, 2.88) | 1.93* | (1.50, 2.50) |
| Internalization of Body Ideals | .65* | (.48, .87) | | |
| Between-Person Effects | | | | |
| Internalization of Body Ideals | 2.04* | (1.34, 3.11) | 1.72* | (1.10, 2.72) |
| Emotion-Oriented Coping | | | 1.04* | (1.01, 1.08) |
| Avoidance-Oriented Coping | | | 1.01 | (.97, 1.06) |
| Internalization X Emotion | | | .99 | (.95, 1.03) |
| Internalization X Avoidance | | | 1.03 | (.98, 1.08) |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

*Figure 6.* The cross-level interaction effect of within-person negative affect and between-person internalization of body ideals predicting the likelihood of reporting symptoms of binge eating.



internalization and stress was not significant. In Model 2, the internalization by emotion-oriented coping interaction was tested to examine whether the association between emotion-oriented coping and the likelihood of reporting one or more symptoms of binge eating differed based on level of internalization of body ideals. It was not significant.

Table 15 presents similar tests between vulnerabilities and university adjustment variables, controlling for gender and the significant gender X social adjustment interaction (illustrated in Chapter II, Figure 4 by the dashed arrow leading from vulnerabilities to the solid arrow connecting university adjustment and symptoms of binge eating). In Model 1, body dissatisfaction X adjustment interactions were tested. Body dissatisfaction interacted with academic adjustment (see Figure 7) to predict the likelihood of reporting one or more symptoms of binge eating. The association between body dissatisfaction and binge eating symptoms was stronger for participants with poor academic adjustment. The body dissatisfaction by social adjustment interaction term was not significant. Model 2 tested the internalization of body ideals by university adjustment interactions. None were significant. The association between academic adjustment and social adjustment and the likelihood of reporting one or more symptoms of binge eating were not moderated by internalization of body ideals.

Table 15

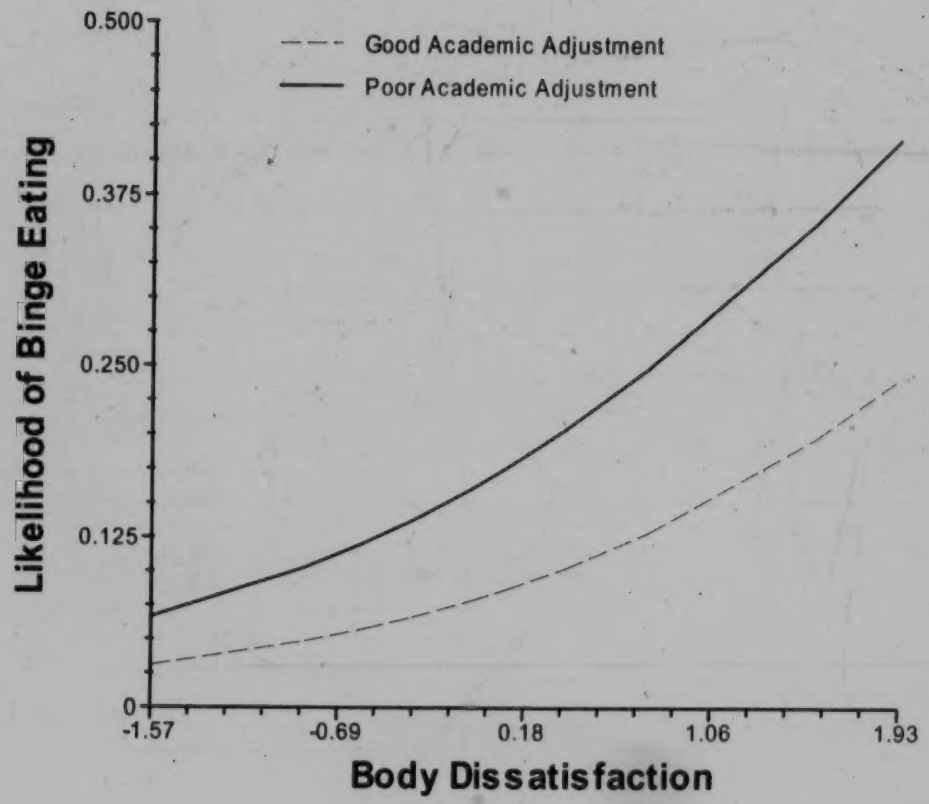
*HGLM Results Testing Interaction Effects of Body Dissatisfaction and Internalization of Body Ideals with University Adjustment Variables on the Likelihood of Reporting Symptoms of Binge Eating, Controlling for Gender*

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | OR | CI | OR | CI |
| Gender | .24* | (.11, .53) | .18* | (.08, .40) |
| Internalization of Body Ideals | | | 2.10* | (1.45, 3.04) |
| Body Dissatisfaction (BD) | 2.22* | (1.34, 3.68) | | |
| Social Adjustment | .99 | (.97, 1.01) | .98* | (.96, .99) |
| Academic Adjustment | .98* | (.97, .99) | .98* | (.96, 1.00) |
| Gender X Social Adjustment | 1.04* | (1.01, 1.07) | 1.05* | (1.02, 1.09) |
| Internalization X Social Adjustment | | | .99 | (.98, 1.01) |
| Internalization X Academic Adjustment | | | 1.02 | (1.00, 1.03) |
| BD X Social Adjustment | .99 | (.96, 1.01) | | |
| BD X Academic Adjustment | 1.02* | (1.01, 1.05) | | |

*Note.* OR = odds ratio. CI = 95% confidence interval of the odds ratio.

* $p < .05$.

*Figure 7.* The body dissatisfaction by academic adjustment effect on the likelihood of reporting symptoms of binge eating.



# CHAPTER V

# DISCUSSION

The present study examined first-year students' reports of symptoms of binge eating during the transition to university. In particular, four models of binge eating were tested. This chapter summarizes the results of these tests and discusses their implications for understanding binge eating during the transition to university from a developmental systems perspective. Limitations and strengths of this research and directions for future research are also presented.

## *Vulnerability Model*

The first model tested was the vulnerability model (see Chapter II, Figure 1). The vulnerability model holds that eating problems, such as binge eating, are more likely to develop for individuals who are at-risk or vulnerable to these problems (Connors, 1996). The vulnerabilities included in the model were female gender, internalization of body ideals, and body dissatisfaction. The first research question asked whether between-person differences in these vulnerabilities would predict average levels of binge eating symptoms across 14 days during the transition to university. Results showed that males were 79% less likely than females to have reported one or more symptoms of binge eating across a two-week period during the first semester of university, controlling for body dissatisfaction and internalization of body ideals. Furthermore, participants who tended to agree that body ideals presented in popular media were important to them were more likely to report one or more symptoms of binge eating. Similarly, participants who more often felt dissatisfied with their bodies were more likely to report binge eating symptoms than participants who less often felt dissatisfied with their bodies. These

results correspond to findings from other research showing that in university samples, females report more eating problems and that these problems are linked to internalization of body ideals and body dissatisfaction (e.g., Morry & Staska, 2001; Striegel-Moore et al., 1989).

Tests of the moderating effects of gender showed that these associations did not differ for males compared to females. Neither interaction term was significant, meaning internalization of body ideals and body dissatisfaction were risk factors for reporting one or more symptoms of binge eating for both females and males. This is important to note because the majority of research on eating problems has been conducted with females. Males in general may be less likely to report symptoms of binge eating in part because they experience lower levels of body dissatisfaction, but the mechanisms linking these vulnerabilities to eating problems appear to be the same. Indeed, in a recent review of the literature on risk factors for eating-related health-risk behaviours used by males to gain a muscular physique (e.g., dieting and steroid use), Cafri et al. (2005) identified media influence, body comparison, and body dissatisfaction as risks.

Overall, these results lend support for the vulnerability model of eating problems, and symptoms of binge eating in particular. From this model, reporting binge eating symptoms during the transition to university would be considered evidence of continuity in functioning. Risk for symptoms of binge eating during the transition to university is greatest for those who enter university with some risk for eating problems (e.g., body dissatisfaction) that typically emerge in early adolescence and possibly earlier (Smolak, 2004). Vulnerabilities do not tell the whole story. Most women feel dissatisfied with their bodies to some extent in Western cultures today (e.g., Tiggemann & Lynch, 2001). This

phenomenon has been referred to as "normative discontent" (Rodin, Silberstein, & Striegel-Moore, 1984). However, not all women develop eating problems as they transition to adulthood. Factors that might be considered temporally more proximal (i.e., day-to-day experiences) might also contribute to the emergence of eating problems.

*Emotion Regulation Model*

The second model tested was the emotion regulation model (see Chapter II, Figure 2). The emotion regulation model of binge eating proposes that eating problems serve as a means of coping with stress and negative emotions (Connors, 1996; Polivy & Herman, 1993). In the current study, experiences of day-to-day stress and negative emotion during the transition to university and general coping style were explored as predictors of symptoms of binge eating. The second, third, and fourth research questions posed in Chapter II pertained to this model. The second research question asked whether stress and negative affect covaried with binge eating symptoms from day-to-day. Within-persons across 14 days, the likelihood of reporting one or more symptoms of binge eating increased on days more stress and more negative affect were reported, compared to days less stress and negative affect were reported. These findings correspond with cross-sectional and longitudinal findings that show that people who binge eat experience more stress and negative emotion (e.g., Hansel & Wittrock, 1997; Tyrka et al., 2002). Furthermore, these findings correspond to other intensive repeated measures studies that found similar patterns of covariation between stress and binge eating and negative affect and binge eating within individuals identified as regular binge eaters (e.g., Freeman & Gil, 2004; Wolff et al., 2000). The current study demonstrated that daily experiences of stress and negative affect are important predictors of mild levels of binge eating

behaviour and that stress and negative affect experienced during the transition to university might contribute to binge eating for some emerging adults.

Are these patterns the same for males and females? In the current study, the moderating effects of gender on the within-person associations between stress and binge eating symptoms and negative affect and binge eating symptoms were tested. Neither interaction was significant. Although females reported more stress and higher binge eating symptoms scores on average across the 14-day period, the within-person associations did not differ for males compared to females. As with the vulnerability model, it is important to point out that the day-to-day mechanisms that increase the risk for binge eating might be the same for males and females. Considering that Binge Eating Disorder has a more even gender distribution that Bulimia Nervosa (Steiger et al., 2003), it is important to identify the processes by which binge eating develops in males as well as females. Not only is body dissatisfaction higher in females, but also according to this study, so is daily experience of stress. Thus, women making the transition to university report higher levels of two risk factors for binge eating symptoms.

The third research question asked whether between-person differences in emotion-oriented coping style and avoidance-oriented coping style would predict average levels of binge eating symptoms across 14 days. Emotion-oriented coping style was associated with average likelihood of reporting one or more symptoms of binge eating. Participants who tended to approach situations by focusing on negative emotions (e.g., getting angry, blaming one's self), were more likely to report symptoms of binge eating. This finding is in line with cross-sectional results linking emotion-oriented coping to eating problems in university student females (e.g., Bittinger & Smith, 2003; Koff &

Sangani, 1997). However, the fact that avoidance-oriented coping was not associated with the likelihood of reporting symptoms of binge eating is inconsistent with previous cross-sectional and daily diary findings where avoidance-oriented coping did predict eating problems (e.g., Koff & Sangani, 1997; Wolff et al., 2000; Freeman & Gil, 2004). Considering that all of this research was conducted with female samples, it is possible that the effect of avoidance-oriented coping on the likelihood of reporting symptoms of binge eating would only be significant for females. Interactions between the coping style variables and gender were tested to determine whether gender moderated the associations between coping style and the likelihood of reporting one or more symptoms of binge eating. Neither the gender by emotion-oriented coping nor the gender by avoidance-oriented coping interaction was significant.

The fourth research question asked whether coping style would interact with daily experiences of stress and negative affect to predict an increased likelihood of reporting one or more symptoms of binge eating. Neither coping style interacted with stress or negative affect to predict binge eating symptoms. The lack of overall association between avoidance-oriented coping and symptoms of binge eating and the non-significant coping by stress and coping by negative affect interactions might reflect the way coping was measured in the current study. General coping style was assessed once, whereas in other studies that found an association between avoidance coping and binge eating (Freeman & Gil, 2004; Wolff et al., 2000), coping was measured on a daily basis. Although emotion-oriented coping style was related to the average likelihood of reporting one or more symptoms of binge eating, measuring daily coping strategies in response to specific stressful events and negative emotions may lend more insight into how coping is related

to symptoms of binge eating. Indeed, Lazarus (1999) and others (Tennen, Affleck, Armeli, & Carney, 2000) have argued that this is the best way to capture the transactional relations among stress, emotion, and coping.

The emotion regulation model was partly supported in the current study. Emotion-oriented coping was associated with increased likelihood of reporting one or more symptoms of binge eating on average and the likelihood of reporting one or more symptoms of binge eating covaried with stress and negative affect. Learning to regulate emotions in a mature way is a salient developmental task of adolescence that continues into emerging adulthood (Galambos & Costigan, 2002). For students making the transition to university, learning to do this effectively can have implications for health-risk behaviours. For example, heavy episodic alcohol use serves as means of relaxation for some university students (Maggs & Schulenberg, 2002). Those who experience more stress and negative emotion as day-to-day states and who tend to have an emotion-oriented coping style (i.e., trait-like approach to day-to-day experiences) when they enter university are at greater risk for binge eating behaviour. This model has highlighted the importance of person-context interaction by looking at the day-to-day lives of students making the transition to university. Moreover, it has demonstrated that proximal factors like daily emotional experiences are important predictors of symptoms of binge eating.

*University Adjustment Model*

In the third model of binge eating, perceived adjustment to university was explored (see Figure 3, Chapter II). Tests of the vulnerability and emotion regulation model showed that resources and vulnerabilities that emerging adults bring to the transition (i.e., temporally distal factors) and how they experience day-to-day life during

the transition (i.e., temporally proximal factors) contribute to symptoms of binge eating. The fifth research question posed in Chapter II asked whether overall academic and social adjustment were related to average levels of binge eating symptoms across 14 days. Students who perceived their academic adjustment to be poor were more likely to report one or more symptoms of binge eating than students whose academic adjustment was good. In addition, females with poor social adjustment were more likely to report one or more symptoms of binge eating than females with good social adjustment (this effect was not significant for males).

Adjusting to academic and social challenges are salient developmental tasks of emerging adulthood and success in these areas predicts later success in related domains and well-being (Schulenberg et al., 2004; Roiseman et al., 2004). Maintaining social support and social integration is associated with physical health outcomes and well-being across adulthood (Cohen, 2004). Across adolescence, girls experience higher levels of interpersonal stress and show increased anxiety and depressive symptoms in response to interpersonal stress, compared to adolescent boys (Rudolph, 2002). Across emerging adulthood, Galambos et al. (2005) found that decreases in social support predicted increases in depressive symptoms; this association was stronger for females. Interpersonal stress, reflected in the current study by poor perceived social adjustment, may be an especially salient risk factor for eating problems for females. Indeed, females with bulimia have been found to be more sensitive to interpersonal stress compared to healthy females (Steiger et al., 1999).

*Integrative Model*

As the previous discussion demonstrated, the results of the current study lend support for each of the individual models. The overarching goal of the current study was to explore an integrative model, wherein elements of the vulnerability, emotion regulation, and university adjustment models were combined to derive a more complete picture of binge eating symptoms during the transition to university (see Figure 4, Chapter II). This goal was derived from a developmental systems perspective that requires the study of person-context interaction in development (Lerner, 1996, 1998). In the integrative model, vulnerabilities and coping style were person-level variables, and daily stress, daily negative affect, and university adjustment reflected the transitional context in the lives of emerging adults. In goodness-of-fit tests of nested models, the vulnerability model made a significant improvement in the prediction of the likelihood of reporting one or more symptoms of binge eating over a baseline model with no predictors. The addition of daily stress, daily negative affect, and emotion-oriented coping provided further improvement in the prediction of the likelihood of reporting symptoms of binge eating. Finally, the addition of university adjustment variables improved the prediction of the likelihood of binge eating symptoms over the combined vulnerability and emotion-regulation model. These results imply that if we are to understand eating problems in university samples, the integrative model provides the most information about potential risk factors. That is, binge eating behaviour is best viewed as deriving from multiple interrelated person-context interactions during this transitional period. The additive effects of the variables in the integrative model indicate that females with greater internalization of body ideals, who are dissatisfied with their

bodies, have an emotion-oriented coping style, and poor perceived academic and social adjustment, are at greatest risk for showing symptoms of binge eating especially when they experience increased stress and/or negative affect. It should be noted, however, that the integrative model was not a saturated model; the addition of other variables may account for additional variance in symptoms of binge eating.

Further tests of the integrative model explored whether vulnerabilities (distal risk factors) moderated the associations of more proximal risks for symptoms of binge eating. First, interactions between emotion regulation variables and vulnerabilities, specifically internalization of body ideals and body dissatisfaction, were tested. The only significant interaction was between internalization of body ideals and daily negative affect. As seen in Figure 6 in Chapter IV, at low levels of negative affect, greater internalization of body ideals was associated with the increased likelihood of reporting one or more symptoms of binge eating. However, at higher levels of negative affect the association reversed—lower levels of internalization were associated with increased likelihood of reporting symptoms of binge eating. At first glance, this might seem like a contradictory finding, especially considering that on average, greater internalization of body ideals was associated with increased likelihood of reporting symptoms of binge eating. Upon further consideration, however, a possible explanation emerges. Agreeing strongly that body ideals are important may inhibit some individuals from binge eating when they experience negative emotions if they believe that the consequences of overeating will move them away from the ideals they uphold. That is, internalization of body ideals may at times pre-empt binge eating. Such a possibility is intriguing and deserves further exploration.

The moderating effects of internalization of body ideals and body dissatisfaction on the associations between university adjustment and the likelihood of reporting one or more symptoms of binge eating were also tested. Body dissatisfaction moderated the effect of academic adjustment on the likelihood of binge eating symptoms. As shown in Figure 6 in Chapter IV, the association between body dissatisfaction and the likelihood of reporting symptoms of binge eating was stronger for participants who experienced poor academic adjustment. This finding is also intriguing. It has been suggested that body dissatisfaction is a necessary but not sufficient risk factor for eating problems (Leon et al., 1993). Poor adaptation to transitional challenges, in this case academic challenges, may contribute to the emergence or consolidation of eating problems for vulnerable individuals or provide the impetus for a negative turning point that takes the form of binge eating behaviour (Graber & Brooks-Gunn, 1996; Rutter, 1996; Schulenberg et al., 2003).

Although it has been proposed that the emergence of eating problems in late adolescence and emerging adulthood is the result of poor adaptation to transitional challenges (Attie & Brooks-Gunn, 1992; Connors, 1996; Smolak & Levine, 1996), specific challenges have not been identified or explored empirically. The current study showed that there is a confluence of factors that, when combined with a major developmental transition, increase risk for experiencing symptoms of binge eating. Levine and Smolak (1992) proposed a cumulative stressor model for the development of eating problems in early adolescence. They argued that three developmental features of adolescence interact with body ideals to predict disordered eating. These included weight gain from puberty, onset of dating, and intensification of academic demands. They

argued that experiencing two or more risks places unique stress on girls in early adolescence. Dickstein (1989) and Smolak and Levine (1996) speculated that challenges associated with the transition to university might trigger eating problems, but little research was cited to back up this speculation. The current study demonstrated that transitional challenges predict an increased likelihood of reporting symptoms of binge eating in emerging adults and that the development of eating problems during the transition out of adolescence should also be viewed from a comprehensive model, one that includes as risks vulnerabilities and salient developmental challenges. The fact that few interactions among variables were significant shows that there might be several pathways to binge eating. Indeed, this would be expected because binge eating is a symptom of both bulimia nervosa and binge eating disorder. Different pathways may lead to different disorders for different people (i.e., contribute to diversity in developmental trajectories). Another consideration is the magnitude of binge eating reported in the current study. Low levels of binge eating symptoms were reported in this community sample of emerging adults. Significant interactions among the variables might be evident in clinical samples where binge eating behaviour is more severe. In a clinical sample, predictors of the magnitude of or variability in binge eating behaviour could be assessed.

*Limitations and Strengths*

The research conducted in the current study had some shortcomings that should be noted. One limitation is that we were unable to determine direction of causality among the variables. Although vulnerabilities were conceptualized as temporally distal risk factors that likely developed during adolescence, internalization of body ideals and body dissatisfaction were not measured prior to the transition to university. There is evidence

of moderate stability in body dissatisfaction across adolescence (Smolak, 2004), but also for change in body dissatisfaction in university samples (Vohs et al., 2001).

Similarly, previous levels of eating pathology, and binge eating behaviour in particular, were not measured, and could not be controlled for in the analyses. We do not know if the participants who reported symptoms of binge eating carried this behaviour over from adolescence or if it emerged during the transition to university. Binge eating and other eating problems have been found to commence during the first year of university (Striegel-Moore et al., 1989) and body dissatisfaction in early adolescence predicts later eating problems (Stice, 2002). Therefore, it is likely that for some individuals in the current study, vulnerabilities were carried over from adolescence and that binge eating symptoms began during the transition.

The question also remains as to whether poor adjustment to university was related to prior levels of functioning or other factors that predict adjustment. For example, adolescents whose expectations of university are more complex and optimistic show better adjustment in their first year and beyond (Jackson, Pancer, Pratt, & Hunsberger, 2000; Pancer, Hunsverger, Pratt, & Alisat, 2000), but these types of measures were not included in the current study. Furthermore, it cannot be determined whether adjustment problems caused individuals to show symptoms of binge eating. Overall, well-being tends to improve across emerging adulthood and improvements are associated with successful negotiation of developmental challenges (Aseltine & Gore, 1993; Galambos et al., 2005; Schulenberg et al., 2004). Therefore, it is reasonable to speculate that adjustment problems may contribute to declines in well-being and that poor adjustment to

university might contribute to the emergence of binge eating behaviour in particular, especially for vulnerable individuals.

The current findings should also be qualified based on the sample characteristics. Participants were first-year students attending a single large research-focused university in Canada, half of whom lived at home with their parents. First-year students attending other institutions with different student body characteristics may have different transition experiences. Caution concerning the generalization of results is thus warranted.

Another limitation of the study was the restricted range or level of severity of binge eating. Because the outcome variable, binge eating symptoms, was dichotomized, predictors of variation in symptom severity across the 14-day period could not be explored. Selecting for individuals who report frequent binge eating would allow for such tests. In addition, selecting for males who report symptoms of binge eating would provide more powerful tests of gender interactions. The lack of significant gender interactions found in the current study may reflect a floor effect, considering that very low levels of binge eating symptoms were reported among males. Thus, again, caution should be observed, as the results of this study may not apply to populations with clinical levels of binge eating or eating disorders.

Despite these limitations, the current study has several strengths. Stice (2002) made several suggestions for how to move forward the study of risks for eating problems. The current study undertook several of these suggestions. The current study (1) tested hypotheses about the development of eating problems during a period characterized by increases in eating problems; (2) studied a specific outcome behaviour as opposed to a general measure of eating problems; (3) tested several risk factors together to determine

independent effects; (4) used a powerful statistical technique to study within-person variation in binge eating; (5) explored a new or understudied risk factor (i.e., university adjustment); (6) used a representative community sample; and (7) proposed an integrative multivariate model of binge eating during the transition to university. Stice (2002) argued that the study of eating problems should move away from simply identifying risk factors for eating problems towards testing models of how risks work together to contribute to eating problems.

The current study addressed these suggestions by proposing and testing an integrative model of binge eating behaviour and demonstrated that a developmental systems perspective is a fruitful theoretical position from which to build comprehensive models of eating problems. Following a developmental systems perspective, discussion was moved from that of identifying risk factors for binge eating in university samples to an exploration of an integrative model of binge eating behaviour that included constructs salient to the transition. Detailed discussion and empirical tests of challenges associated with the transition to adulthood, and university in particular, are missing from the eating problems literature. By viewing eating problems from a developmental systems perspective, transitional challenges were conceptualized more thoroughly in the current study (e.g., conceptualization of emotion-regulation processes as a salient developmental task of this period).

Theoretical advances translated into methodological strengths of the study. The daily diary method captured the day-to-day lives of emerging adults as they experienced the transition to university. This allowed temporally distal risk factors (person variables) to be linked to more proximal processes (contextual experiences) contributing to binge

eating symptoms during a period of increased risk for eating problems. That is, person-context interaction was explored. The inclusion of males in the current study is also an improvement over much of the research reviewed in Chapter II. Some males do binge eat and the lack of significant gender interactions may indicate that similar risk processes may be at work for males as for females during the transition to university. Moreover, gender differences that did emerge highlight the ways in which females are at greater risk for eating problems (e.g., greater body dissatisfaction and increased stress).

*Future Directions*

To address the limitations outlined above, adolescents should be followed over time, from high school, through emerging adulthood if change in eating problems is to be fully understood. A longitudinal study of eating problems would allow for within-person trajectories of eating problems to be delineated and between-person predictors of within-person trajectories to be identified. Questions about change over time and interindividual differences in intraindividual change could be addressed. Similar questions can be posed about change in eating problems over the course of the first year of university. What are the intraindividual trajectories of eating problems across first-year and what predicts within-person change? Does binge eating during the transition to university impact later health outcomes and/or success in the university context? Anderson, Shapiro, and Lundgren (2003) found that one quarter of their freshmen sample gained more than 2.3 kg (5 lbs) across the first semester of university and 14% who were considered average weight in September were considered overweight or obese in December (based on body mass index). Does binge eating predict weight gain during the transition to university? Exploring fluctuations in symptom severity among individuals evidencing clinical levels

of binge eating would also be of interest. Is the magnitude of stress and negative affect reported predictive of symptom severity from day-to-day? Future research should also unpack and explore further the constructs of academic and social adjustment and their role in predicting binge eating. This might entail expanding the construct of university adjustment to include other salient developmental tasks of this period such as establishing autonomy (Galambos & Costigan, 2002). Additionally, the links between binge eating and other health-risk behaviours and indicators of well-being should be explored in an effort to better understand overall adjustment to transitional challenges. For example, heavy episodic alcohol use is associated with binge eating in university samples (Fischer, Anderson, & Smith, 2004) and eating problems often overlap with symptoms of depression, which increase across first-year for students who experience high levels of stress (Wintre & Yaffe, 2000).

Overall, the current study has pointed to the importance of exploring multiple interrelated person-context interactions that contribute to binge eating symptoms during the transition to university. In bulimia nervosa, binge eating behaviour precedes compensatory behaviours (e.g., vomiting, laxative use) by one to two years (Stice, Killen, Hayward, & Taylor, 1998) and binge eating predicts weight gain over time and is more prevalent among obese individuals (Striegel-Moore & Franko, 2003). Identifying predictors of mild levels of binge eating in a population at risk for eating problems has important implications for treatment and prevention efforts. Because poor adjustment to university may be associated with problems that for some take the form of binge eating, helping students cope with stress and negative emotions and adjust to new academic and social demands may prevent these and other problems from seriously affecting success

and overall well-being. As more and more adolescents go on to post-secondary studies, the importance of understanding this transition and its implications for health outcomes increases.

## FOOTNOTES

[1]Material for the SACQ copyright © 1989 by Western Psychological Services. Adapted for specific, limited research used by Nancy Galambos, University of Alberta, by permission of the publisher, Western Psychological Services, 12031 Wilshire Boulevard, Los Angeles, California 90025, U.S. A. (www.wpspublish.com). No additional reproduction, in whole or in part, by any medium or for any purpose, may be made without the prior, written authorization of Western Psychological Services. All rights reserved.

[2]The binge eating subscale utilized in this study was adapted and reproduced by special permission of Psychological Assessment Resources, Inc., 16204 North Florida Avenue, Lutz, Florida 33549, from the Eating Disorders Inventory (collectively, EDI and EDI-2) by Garner, Olmstead, and Polivy, Copyright 1983 by Psychological Assessment Resources, Inc. Further reproduction is prohibited without prior permission from Psychological Assessment Resources, Inc.

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## APPENDIX A

### Demographic Information

**BACKGROUND**

**Please read the following questions. Check or circle the appropriate response, or fill in the blanks. You are free to refuse to answer any item.**

**Birthdate** ____/____/____
Day Month Year

**Sex** (circle one) Female Male

**How would you describe your general living situation growing up?** (check one)

____ Lived with both parents most of the time

____ Lived with a single parent most of the time

____ Lived in a combination of two-parent, single-parent, and step-parent situations

____ Other (please specify) _____

**My MOTHER completed**
(circle yes or no for the female parent you spent the most time with growing up)

| | | |
|---|---|---|
| Elementary school | **yes** | **no** |
| High school | **yes** | **no** |
| College or technical school | **yes** | **no** |
| University | **yes** | **no** |

**My FATHER completed**
(circle yes or no for the male parent you spent the most time with growing up)

| | | |
|---|---|---|
| Elementary school | **yes** | **no** |
| High school | **yes** | **no** |
| College or technical school | **yes** | **no** |
| University | **yes** | **no** |

**Your marital status** (circle one) Never married Married Divorced Cohabiting

**Where do you live now?** (check one)

_____ With parent(s)
_____ With relative(s) other than parent
_____ In residence at the U of A
Which residence? _____
_____ In own place, individually or with roommates (e.g., apartment)
_____ Other (please specify) _____

**Ethnicity** (please check <u>all</u> that apply)

_____ Asian (e.g., Chinese, Korean)
_____ Latino (e.g., Mexican, Puerto Rican)
_____ Black
_____ White
_____ Aboriginal (First Nation, Métis, etc.)
_____ Arabic/Middle Eastern
_____ Indo-Canadian (e.g., Indian, Pakistani)
_____ Other (please specify) _____

**What Faculty at the U of A are you <u>currently</u> in?** (Please check one)

_____ Agriculture/Forestry/Home Economics
_____ Arts
_____ Business
_____ Education
_____ Engineering
_____ Medicine and Dentistry
_____ Native Studies
_____ Nursing
_____ Pharmacy and Pharmaceutical Sciences
_____ Physical Education and Recreation
_____ Rehabilitation Medicine
_____ Science
_____ Other: please specify _____

# APPENDIX B

## Consent Form

**Purpose**. You are invited to participate in a study (***Making the Transition***) conducted by Dr. Nancy Galambos of the Department of Psychology, University of Alberta, and Dr. Jennifer Maggs of the Department of Human Development and Family Studies, Pennsylvania State University. This study examines how first-year students make the transition to university. We are interested in (1) relations among feelings, stressful experiences, and health-related behaviors like drinking on a daily basis; (2) whether personal characteristics such as level of maturity affect daily feelings, experiences, and behaviors; and (3) the long-term impact of personal characteristics and daily experiences on academic performance.

**Your participation** involves

- completing some questionnaires today that ask about the ways that you deal with stress, your general health habits, personal characteristics and behaviours, and height and weight;
- completing an on-line daily checklist (*Daily Checklist*) indicating how often you experienced various feelings (e.g., felt active) and behaviors (e.g., had a good night's sleep) that day. You are requested to log on to the computer for 14 consecutive days (Days 1 – 14) and complete the checklist each night before you go to bed (or until noon the following day). Completing the on-line checklist will take about 5 – 10 minutes each time you do it;
- completing a short set of one-time-only questions that appear on-line occasionally after you have completed the *Daily Checklist*;
- granting us access to your confidential student records (based in the Office of the Registrar) so that we may track your academic performance from now through winter term (April) 2009. These records include and are limited to your:
    - high school GPA used for admission
    - U of A term GPA and individual final grades for each course (from fall 2004 through winter 2009), along with course weight/units
    - # of courses taken per term, including courses completed, audited, and withdrawn
    - program
    - academic standing (i.e., Dean's list; academic probation)
    - registration status (enrolled, withdrawn)
    - degrees and awards granted
    - award, ceremony, and withdrawal dates, if appropriate
    - disciplinary record of suspension or expulsion

As compensation for the time spent completing online checklists and questions, you will receive $5 for each day that you submit a checklist. Your email address will be used to send you an initial reminder to complete the checklist. We will send a few reminder emails throughout the 14-day period. You will collect your total compensation in person (to a maximum of $70 after the end of the 14-day period).

**Your rights.** Your participation in this study is voluntary, and you may decide at any time to withdraw from the study. Discontinuation will not affect your academic status or access to services from the University of Alberta. If you choose to participate, it is desirable that you complete as many days and items as possible. However, you may skip days and any items on the checklists or questionnaires. The computerized data file will NOT contain any personal identifiers (i.e., names or student ID numbers) other than the meaningless ID number we assign at the start of the study. Thus, your responses in the datafile will be anonymous. Only researchers and assistants associated with the project will have access to the data. A list linking your name and student ID number with the meaningless ID number (necessary to track academic performance) will be kept in a locked room. Confidentiality will be maintained. The results of this study may be presented at scholarly conferences, published in professional journals, or presented in class lectures. Only grouped

(aggregate) data will be presented. The data will be securely stored by Dr. Galambos for a minimum of five years until the data are destroyed.

**It is important for you to remember that consent to participate in this study means that we will track your academic performance through winter 2009 unless you inform Dr. Galambos (via email, mail, or phone) that you withdraw permission to access your records. If you withdraw, no data will be collected from your academic records from that point forward. Data collected prior to withdrawal will be retained for analysis.**

**Benefits and risks.** This research can potentially contribute to our understanding of how university students experience and cope with their lives on a daily basis, and how we can promote health and well-being during this transition. There are no foreseeable risks to this study, but if any risks should arise, the researcher will inform the participants immediately. If you should experience any adverse effects, please contact Dr. Galambos immediately.

**Contact information.** If you have any questions or comments on the study, or if you wish a clarification of your rights as a research participant, you can contact Dr. Galambos or the Human Research Ethics Committee at the number and address below.

| | |
|---|---|
| **Nancy Galambos**, Ph.D.<br>Department of Psychology<br>University of Alberta<br>Edmonton, AB T6G 2E9<br>(780) 492-4607<br>galambos@ualberta.ca | **Tom Johnson,** Ph.D.<br>Chair, Human Research Ethics Committee<br>Department of Psychology, University of Alberta<br>Edmonton, AB T6G 2E9<br>(780) 492-2834 |

How did you hear about this study? **(check one)**

- ☐ received an email from makingit@ualberta.ca
- ☐ heard about it from a friend
- ☐ other

**Signatures.** Please sign below to indicate that you have read and understood the nature and purpose of the study. Your signature acknowledges the receipt of a copy of the consent form as well as indicates your willingness to participate in this study. It also indicates your willingness to have us contact you via email.

Participant's Name **(PLEASE PRINT NAME AS IT APPEARS ON YOUR ONECARD)**

Participant's e-mail address **(PLEASE PRINT CLEARLY, AND DISTINGUISH BETWEEN UPPER- AND LOWER-CASE LETTERS). This address will be used to send a few email reminders, and we need this address if you are to participate in the study.**

Participant's Student ID **(AS IT APPEARS ON ONECARD). This ID will be used to contact the Registrar for your student records.**

Participant's Signature **Date**

Researcher's Signature **Date**

☐ Verified with OneCard

## APPENDIX C

### Sociocultural Attitudes Towards Appearance Questionnaire

**MY APPEARANCE**

**Please circle the appropriate number from 1 (Completely agree) to 5 (Completely disagree) for each of the following statements:**

| 1 Completely Disagree | 2 | 3 Neither Agree nor Disagree | 4 | 5 Completely Agree |
|---|---|---|---|---|

| | | Completely Disagree | | | | Completely Agree |
|---|---|---|---|---|---|---|
| 1. | I would like my body to look like the people who are on TV | 1 | 2 | 3 | 4 | 5 |
| 2. | I would like my body to look like the models who appear in magazines | 1 | 2 | 3 | 4 | 5 |
| 3. | I would like my body to look like the people who are in movies | 1 | 2 | 3 | 4 | 5 |
| 4. | I wish I looked like the models in music videos | 1 | 2 | 3 | 4 | 5 |
| 5. | I try to look like people in music videos | 1 | 2 | 3 | 4 | 5 |
| 6. | I try to look like the people on TV | 1 | 2 | 3 | 4 | 5 |
| 7. | I wish I looked as athletic as the people in magazines | 1 | 2 | 3 | 4 | 5 |
| 8. | I wish I looked as athletic as sports stars | 1 | 2 | 3 | 4 | 5 |
| 9. | I try to look like sports athletes | 1 | 2 | 3 | 4 | 5 |

**TV/Magazine Items: 1 - 6**

**Athlete Items: 7 - 9**

## APPENDIX D

### Body-Esteem Scale for Adolescents and Adults

**MY BODY**

**Indicate how often you agree with the following statements ranging from 'never' (0) to 'always' (4). Circle the appropriate number beside each statement.**

| 0 Never | 1 Seldom | 2 Sometimes | 3 Often | 4 Always |
|---|---|---|---|---|

| | Never | | | | Always |
|---|---|---|---|---|---|
| 1. I like what I look like in pictures. | 0 | 1 | 2 | 3 | 4 |
| 2. I'm proud of my body. | 0 | 1 | 2 | 3 | 4 |
| 3. I am preoccupied with trying to change my body weight. | 0 | 1 | 2 | 3 | 4 |
| 4. I like what I see when I look in the mirror. | 0 | 1 | 2 | 3 | 4 |
| 5. There are lots of things I'd change about my looks if I could. | 0 | 1 | 2 | 3 | 4 |
| 6. I am satisfied with my weight. | 0 | 1 | 2 | 3 | 4 |
| 7. I wish I looked better. | 0 | 1 | 2 | 3 | 4 |
| 8. I really like what I weigh. | 0 | 1 | 2 | 3 | 4 |
| 9. I wish I looked like someone else. | 0 | 1 | 2 | 3 | 4 |
| 10. My looks upset me. | 0 | 1 | 2 | 3 | 4 |
| 11. I'm pretty happy about the way I look. | 0 | 1 | 2 | 3 | 4 |
| 12. I feel I weigh the right amount for my height. | 0 | 1 | 2 | 3 | 4 |
| 13. I feel ashamed of how I look. | 0 | 1 | 2 | 3 | 4 |
| 14. Weighing myself depresses me. | 0 | 1 | 2 | 3 | 4 |
| 15. My weight makes me unhappy. | 0 | 1 | 2 | 3 | 4 |
| 16. I worry about the way I look. | 0 | 1 | 2 | 3 | 4 |
| 17. I think I have a good body. | 0 | 1 | 2 | 3 | 4 |
| 18. I'm looking as nice as I'd like to. | 0 | 1 | 2 | 3 | 4 |

**Appearance Subscale Items: 1, 2, 4, 5, 7, 9, 10, 11, 13, 16, 17, 18**

**Weight Subscale Items: 3, 6, 8, 12, 14, 15**

APPENDIX E

The Positive and Negative Affect Schedule

Negative Affect Subscale

## Daily Checklist

**Think back over your day and answer the following questions:**

Indicate to what extent you have felt the following different emotions and feelings **today**.

| | Very Slightly or Not At All | A Little | Moderately | Quite A Bit | Extremely |
|---|---|---|---|---|---|
| Upset | ○ | ○ | ○ | ○ | ○ |
| Scared | ○ | ○ | ○ | ○ | ○ |
| Ashamed | ○ | ○ | ○ | ○ | ○ |
| Distressed | ○ | ○ | ○ | ○ | ○ |
| Hostile | ○ | ○ | ○ | ○ | ○ |
| Irritable | ○ | ○ | ○ | ○ | ○ |
| Guilty | ○ | ○ | ○ | ○ | ○ |
| Nervous | ○ | ○ | ○ | ○ | ○ |
| Jittery | ○ | ○ | ○ | ○ | ○ |
| Afraid | ○ | ○ | ○ | ○ | ○ |

APPENDIX F

Daily Inventory of Stressful Events

## Situations

Please indicate whether or not you experienced the following stressful situations **today**. If you check "yes", indicate how stressful the experience was for you.

a) **Since this time yesterday...** did you have an argument or disagreement with anyone?
b) **Since this time yesterday...** did anything happen that you could have argued about but decided to let pass to avoid disagreement?
c) **Since this time yesterday...** did anything happen at work or school (other than what you have already mentioned) that most people would consider stressful?
d) **Since this time yesterday...** did anything happen at home (other than what you have already mentioned) that most people would consider stressful?
e) Many people experience discrimination on the basis of such things as race, sex, or age. **Since this time yesterday...** did anything like this happen to you?
f) **Since this time yesterday...** did anything happen to a close friend or relative (other than what you have already mentioned) that turned out to be stressful for you?
g) **Since this time yesterday...** did anything else happen to you that most people would consider stressful?

**Y/N**

**If "yes", how stressful was this experience for you?**

**Not at All**

**Not Very**

**Somewhat**

**Very**